

METHOD AND APPARATUS USED IN NODE FOR WIRELESS COMMUNICATION

Technical Field

[0001] The present application relates to a transmission method and apparatus in a wireless communication system, in particular to a transmission method and apparatus for wireless signals in a wireless communication system supporting a cellular network.

Background Art

[0002] In an existing New Radio (NR) system, spectrum resources are divided into a Frequency Division Duplexing (FDD) spectrum and a Time Division Duplexing (TDD) spectrum. For the TDD spectrum, both a base station and user equipment (UE) operate in a half-duplex mode. Such a half-duplex mode avoids self-interference and can alleviate the impact of cross link interference, but it also brings about a decrease in resource utilization rate and an increase in latency. In response to these problems, supporting a flexible duplex mode or a variable link direction (uplink or downlink or flexible) on the TDD spectrum or the FDD spectrum becomes a possible solution. In the 3rd Generation Partner Project (3GPP) Radio Access Network (RAN) #88e meeting and the 3GPP Release (R)-18 workshop, supporting a more flexible duplex mode or a full duplex mode in NR R-18 has received extensive attention and discussion, especially a Subband Non-overlapping Full Duplex (SBFD) mode at an NR node B gNB (gNB) side. In this mode, the same symbol will be used for uplink in a part of frequency resources and used for downlink in another part of the frequency resources. Therefore, the resource utilization rate is improved, and the latency is reduced.

Summary of the Invention

[0003] The inventor found through research that how to determine occasions of random access is a key problem.

[0004] In view of the above problem, the present application discloses a solution. It should be noted that in the description of the present application, the more flexible duplex mode, the full duplex mode and the SBFD mode are merely used as examples. The present application can also be applied to other duplex mode scenarios. Furthermore, adopting a unified design scheme for different scenarios (including but not limited to the more flexible duplex mode, the full duplex mode, the SBFD mode, a half duplex mode, a traditional duplex mode, a network energy saving mode, a non-energy saving mode, etc.) can also help to reduce hardware complexity and cost. In

the absence of conflicts, embodiments and features in the embodiments in any node of the present application can be applied to any other node. In the absence of conflicts, embodiments and features in the embodiments of the present application can be arbitrarily combined with each other.

[0005] As one embodiment, the interpretation of the terminology in the present application is based on the definition provided in the TS38 series of the 3GPP specifications.

[0006] As one embodiment, the interpretation of the terminology in the present application is based on the definition provided in the TS37 series of the 3GPP specifications.

[0007] The present application discloses a method used in a first node for wireless communication, characterized by comprising:

receiving a first information block, wherein the first information block indicates a reference time domain resource set, and the reference time domain resource set comprises one or more symbols configured as Downlink (DL) by higher layer parameters; and

transmitting first random access preambles in first Physical Random Access Channel (PRACH) occasions, wherein a candidate set of the first PRACH occasions is a first PRACH occasion set or a second PRACH occasion set, the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain, and the second PRACH occasion set and the reference time domain resource set overlap in the time domain,

wherein the transmission of the first random access preambles belongs to one of a first type of random access process or a second type of random access process; when the transmission of the first random access preambles belongs to the first type of random access process, the candidate set of the first PRACH occasions is the first PRACH occasion set; and when the transmission of the first random access preambles belongs to the second type of random access process, the candidate set of the first PRACH occasions is the second PRACH occasion set.

[0008] As one embodiment, the problem to be solved by the present application comprises: how to determine the candidate set of the first PRACH occasions when the reference time domain resource set is configured.

[0009] As one embodiment, the benefits of the above method comprise: in the more flexible duplex mode/full duplex mode/SBFD mode, available resources for uplink/downlink become more flexible, and how to determine the candidate set of the first PRACH occasions.

[0010] As one embodiment, in the above method, the candidate set of the first PRACH occasions depends on a type of a random access process, which solves this problem.

[0011] As one embodiment, the benefits of the above method comprise: selecting PRACH occasions according to different types of random access processes ensures reliability of the selected PRACH occasions and improves system performance.

[0012] As one embodiment, the benefits of the above method comprise: supporting more

flexible configuration of the reference time domain resource set and different types of random access processes increases flexibility of system design and optimizes system performance.

[0013] According to one aspect of the present application, it is characterized in that one of the first type of random access process and the second type of random access process is contention based, and the other is contention free.

[0014] According to one aspect of the present application, it is characterized in that one of the first type of random access process and the second type of random access process is a four-step random access process, and the other is a two-step random access process.

[0015] As one embodiment, the benefits of the above method comprise: flexibly dividing the types of the random access process improves flexibility of configuration.

[0016] As one embodiment, the benefits of the above method comprise: simple implementation and small changes to a standard.

[0017] According to one aspect of the present application, it is characterized in that a priority of the first type of random access process is lower than a priority of the second type of random access process.

[0018] As one embodiment, the benefits of the above method comprise: increasing an access opportunity of a high-priority random access process, and reducing latency.

[0019] According to one aspect of the present application, it is characterized in that the first type of random access process is initiated for a first event set, and the second type of random access process is initiated for a second event set; and the first event set comprises one or more events, the second event set comprises one or more events, and any event in the first event set does not belong to the second event set.

[0020] As one embodiment, the benefits of the above method comprise: simple implementation, and having good compatibility.

[0021] According to one aspect of the present application, it is characterized in that any feature to the first type of random access process is not a feature to the second type of random access process.

[0022] As one embodiment, the benefits of the above method comprise: different types of random access processes are applicable to different features, and the applicable features implicitly indicate the types of random access processes, thereby reducing signaling overhead.

[0023] According to one aspect of the present application, it is characterized in that, in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters, at least one subcarrier or at least one Resource Block (RB) is used for uplink transmission.

[0024] As one embodiment, the benefits of the above method comprise: supporting the uplink

transmission on DL symbols improves uplink capacity, improves a resource utilization rate, and reduces latency.

[0025] According to one aspect of the present application, it is characterized by comprising:

receiving a second information block,

wherein the second information block indicates a reference frequency domain resource set; the reference frequency domain resource set comprises at least one subcarrier or at least one RB used for uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters; and a PRACH occasion in the second PRACH occasion set that belongs, in the time domain, to the reference time domain resource set belongs, in the frequency domain, to the reference frequency domain resource set.

As one embodiment, the benefits of the above method comprise: increasing available PRACH occasions, and reducing latency of random access.

[0026] The present application discloses a method used in a second node for wireless communication, characterized by comprising:

transmitting a first information block, wherein the first information block indicates a reference time domain resource set, and the reference time domain resource set comprises one or more symbols configured as Downlink (DL) by higher layer parameters; and

receiving first random access preambles in first PRACH occasions, wherein a candidate set of the first PRACH occasions is a first PRACH occasion set or a second PRACH occasion set, the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain, and the second PRACH occasion set and the reference time domain resource set overlap in the time domain,

wherein the reception of the first random access preambles belongs to one of a first type of random access process or a second type of random access process; when the reception of the first random access preambles belongs to the first type of random access process, the candidate set of the first PRACH occasions is the first PRACH occasion set; and when the reception of the first random access preambles belongs to the second type of random access process, the candidate set of the first PRACH occasions is the second PRACH occasion set.

[0027] According to one aspect of the present application, it is characterized in that one of the first type of random access process and the second type of random access process is contention based, and the other is contention free.

[0028] According to one aspect of the present application, it is characterized in that one of the first type of random access process and the second type of random access process is a four-step random access process, and the other is a two-step random access process.

[0029] According to one aspect of the present application, it is characterized in that a priority

of the first type of random access process is lower than a priority of the second type of random access process.

[0030] According to one aspect of the present application, it is characterized in that the first type of random access process is initiated for a first event set, and the second type of random access process is initiated for a second event set; and the first event set comprises one or more events, the second event set comprises one or more events, and any event in the first event set does not belong to the second event set.

[0031] According to one aspect of the present application, it is characterized in that any feature to the first type of random access process is not a feature to the second type of random access process.

[0032] According to one aspect of the present application, it is characterized in that, in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters, at least one subcarrier or at least one Resource Block (RB) is used for uplink transmission.

[0033] According to one aspect of the present application, it is characterized by comprising:

transmitting a second information block,

wherein the second information block indicates a reference frequency domain resource set; the reference frequency domain resource set comprises at least one subcarrier or at least one RB used for uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters; and a PRACH occasion in the second PRACH occasion set that belongs, in the time domain, to the reference time domain resource set belongs, in the frequency domain, to the reference frequency domain resource set.

[0034] The present application discloses a first node device used for wireless communication, characterized by comprising:

a first receiver receiving a first information block, wherein the first information block indicates a reference time domain resource set, and the reference time domain resource set comprises one or more symbols configured as Downlink (DL) by higher layer parameters; and

The first transmitter transmitting first random access preambles in first PRACH occasions, wherein a candidate set of the first PRACH occasions is a first PRACH occasion set or a second PRACH occasion set, the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain, and the second PRACH occasion set and the reference time domain resource set overlap in the time domain;

wherein the transmission of the first random access preambles belongs to one of a first type of random access process or a second type of random access process; when the transmission of the first random access preambles belongs to the first type of random access process, the candidate set

of the first PRACH occasions is the first PRACH occasion set; and when the transmission of the first random access preambles belongs to the second type of random access process, the candidate set of the first PRACH occasions is the second PRACH occasion set.

[0035] The present application discloses a second node device used for wireless communication, characterized by comprising:

a second transmitter transmitting a first information block, wherein the first information block indicates a reference time domain resource set, and the reference time domain resource set comprises one or more symbols configured as Downlink (DL) by higher layer parameters; and

The second receiver receiving first random access preambles in first PRACH occasions, wherein a candidate set of the first PRACH occasions is a first PRACH occasion set or a second PRACH occasion set, the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain, and the second PRACH occasion set and the reference time domain resource set overlap in the time domain;

wherein the reception of the first random access preambles belongs to one of a first type of random access process or a second type of random access process; when the reception of the first random access preambles belongs to the first type of random access process, the candidate set of the first PRACH occasions is the first PRACH occasion set; and when the reception of the first random access preambles belongs to the second type of random access process, the candidate set of the first PRACH occasions is the second PRACH occasion set.

[0036] As one embodiment, compared with the traditional scheme, the present application has the following advantages:

- improving performance and flexibility of a system;
- simple implementation, small changes to a standard, and having good compatibility;
- reducing signaling overhead; and
- reducing latency.

Brief Description of the Drawings

[0037] Other features, purposes and advantages of the present application will become more apparent by reading the detailed description of the non-limiting embodiments in the following drawings with reference to them:

FIG. 1 shows a flow chart of a first information block and a first random access preamble according to one embodiment of the present application;

FIG. 2 shows a schematic diagram of a network architecture according to one embodiment of the present application;

FIG. 3 shows a schematic diagram of an embodiment of a radio protocol architecture for a

user plane and a control plane according to one embodiment of the present application;

FIG. 4 shows a schematic diagram of a first communication device and a second communication device according to one embodiment of the present application;

FIG. 5 shows a flow chart of a transmission according to one embodiment of the present application;

FIGs. 6A-6B respectively show schematic diagrams of a first type of random access process and a second type of random access process according to one embodiment of the present application;

FIG. 7 shows a schematic diagram of a priority of a first type of random access process and a priority of a second type of random access process according to one embodiment of the present application;

FIG. 8 shows a schematic diagram of a first event set and a second event set according to one embodiment of the present application;

FIG. 9 shows a schematic diagram of a feature to a first type of random access process and a feature to a second type of random access process according to one embodiment of the present application;

FIG. 10 shows a schematic diagram in which a subcarrier or resource block is used for uplink transmission according to one embodiment of the present application;

FIG. 11 shows a schematic diagram of a second information block and a reference frequency domain resource set according to one embodiment of the present application;

FIG. 12 shows a structural block diagram of a processing apparatus used in a first node device according to one embodiment of the present application; and

FIG. 13 shows a structural block diagram of a processing apparatus used in a second node device according to one embodiment of the present application.

Detailed Description of Embodiments

[0038] The technical solution of the present application will be further described in detail below in conjunction with the drawings. It should be noted that, in the absence of conflicts, embodiments and features in the embodiments in the present application may be arbitrarily combined with each other. Based on considerations of flexibility, complexity, overhead, compatibility, etc., those skilled in the art are motivated to flexibly combine the embodiments in different drawings without conflicts, such as (but not limited to) the embodiment in FIG. 1 and the embodiments in FIGs. 5-11, the embodiment in FIG. 5 and the embodiments in FIGs. 6-11.

[0039] Embodiment 1

[0040] Embodiment 1 illustrates a flow chart of a first information block and a first random

access preamble according to one embodiment of the present application, as shown in FIG. 1. In 100 shown in FIG. 1, each block represents one step. In particular, the order of steps in blocks does not represent a specific chronological relationship among various steps.

[0041] In Embodiment 1, the first node in the present application, in step 101, receives a first information block, wherein the first information block indicates a reference time domain resource set, and the reference time domain resource set comprises one or more symbols configured as DL by higher layer parameters; and in step 102, transmits first random access preambles in first PRACH occasions, wherein a candidate set of the first PRACH occasions is a first PRACH occasion set or a second PRACH occasion set, the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain, and the second PRACH occasion set and the reference time domain resource set overlap in the time domain, wherein the transmission of the first random access preamble belongs to one of a first type of random access process or a second type of random access process; when the transmission of the first random access preamble belongs to the first type of random access process, the candidate set of the first PRACH occasions is the first PRACH occasion set; and when the transmission of the first random access preamble belongs to the second type of random access process, the candidate set of the first PRACH occasions is the second PRACH occasion set.

[0042] As one embodiment, the first information block is carried by higher layer signaling.

[0043] As one embodiment, the first information block is carried by Radio Resource Control (RRC) signaling.

[0044] As one embodiment, the first information block comprises all or some of fields in one RRC Information Element (IE).

[0045] As one embodiment, the first information block comprises all or some of fields in each RRC IE of a plurality of RRC IEs.

[0046] As one embodiment, the first information block comprises all or some of fields in a TDD-UL-DL-ConfigCommon IE.

[0047] As one embodiment, the first information block comprises all or some of fields in a TDD-UL-DL-ConfigDedicated IE.

[0048] As one embodiment, the first information block comprises all or some of fields in a ServingCellConfig IE.

[0049] As one embodiment, the first information block comprises all or some of fields in a ServingCellConfigCommonSIB IE.

[0050] As one embodiment, the first information block comprises all or some of fields in a ServingCellConfigCommon IE.

[0051] As one embodiment, the first information block is carried by at least one RRC IE.

- [0052] As one embodiment, the first information block is carried by a TDD-UL-DL-ConfigCommon IE.
- [0053] As one embodiment, the first information block is carried by a TDD-UL-DL-ConfigDedicated IE.
- [0054] As one embodiment, the first information block is carried by a ServingCellConfig IE.
- [0055] As one embodiment, the first information block is carried by a ServingCellConfigCommonSIB IE.
- [0056] As one embodiment, the first information block is carried by a ServingCellConfigCommon IE.
- [0057] As one embodiment, the name of one IE carrying the first information block comprises TDD-UL-DL-Config.
- [0058] As one embodiment, the name of one IE carrying the first information block comprises ServingCellConfig.
- [0059] As one embodiment, the first information block is carried by a MAC CE (Medium Access Control Layer Control Element).
- [0060] As one embodiment, the first information block comprises a MAC CE.
- [0061] As one embodiment, the first information block is carried by Downlink Control Information (DCI).
- [0062] As one embodiment, the first information block comprises DCI.
- [0063] As one embodiment, the first information block comprises one or more fields in one piece of DCI.
- [0064] As one embodiment, the first information block is carried by DCI format 2_0.
- [0065] As one embodiment, the first information block comprises DCI format 2_0.
- [0066] As one embodiment, the first information block is carried by RRC signaling and MAC CE.
- [0067] As one embodiment, the first information block is carried by higher layer signaling and the DCI.
- [0068] As one embodiment, the first information block is carried jointly by RRC signaling, a MAC CE, and DCI.
- [0069] As one embodiment, for the specific definitions of a TDD-UL-DL-ConfigCommon IE, a TDD-UL-DL-ConfigDedicated IE, a ServingCellConfig IE, a ServingCellConfigCommonSIB IE, and a ServingCellConfigCommon IE, see Chapter 6.3.2 of 3GPP TS 38.331.
- [0070] As one embodiment, for the specific definitions of DCI format 2_0, see Chapter 7.3.1 of 3GPP TS 38.212.
- [0071] As one embodiment, the first information block is used for determining the reference

time domain resource set.

[0072] As one embodiment, the first information block indicates the reference time domain resource set.

[0073] As one embodiment, the first information block is used for indicating the reference time domain resource set.

[0074] As one embodiment, the first information block explicitly indicates the reference time domain resource set.

[0075] As one embodiment, the first information block implicitly indicates the reference time domain resource set.

[0076] As one embodiment, the first information block indicates a period and a time offset of the reference time domain resource set.

[0077] As one embodiment, the first information block indicates time domain resources included in the reference time domain resource set within one period.

[0078] As one embodiment, the first information block indicates symbols included in the reference time domain resource set within one period.

[0079] As one embodiment, the first information block indicates slots included in the reference time domain resource set within one period.

[0080] As one embodiment, the first information block indicates which slots belong to the reference time domain resource set.

[0081] As one embodiment, the first information block indicates which symbols belong to the reference time domain resource set.

[0082] As one embodiment, the first information block indicates which slots in one period belong to the reference time domain resource set.

[0083] As one embodiment, the first information block indicates which symbols in one period belong to the reference time domain resource set.

[0084] As one embodiment, the first information block indicates locations of slots included in the reference time domain resource set within one period.

[0085] As one embodiment, the first information block indicates locations of symbols included in the reference time domain resource set within one period.

[0086] As one embodiment, the first information block explicitly configures the reference time domain resource set.

[0087] As one embodiment, the first information block explicitly configures a period of the reference time domain resource set.

[0088] As one embodiment, the first information block explicitly configures a period and a time offset of the reference time domain resource set.

- [0089] As one embodiment, the first information block explicitly configures locations of slots included in the reference time domain resource set within one period.
- [0090] As one embodiment, the first information block explicitly configures locations of symbols included in the reference time domain resource set within one period.
- [0091] As one embodiment, the first information block configures symbols in the reference time domain resource set as a first type.
- [0092] As one embodiment, the first information block indicates the reference time domain resource set by configuring symbols in the reference time domain resource set as a first type.
- [0093] As one embodiment, the first type is different from Uplink (UL) and Downlink (DL).
- [0094] As one embodiment, the first type is different from uplink, downlink and Flexible.
- [0095] As one embodiment, the first type is different from sidelink.
- [0096] As one embodiment, the first type of symbol is an SBFD symbol.
- [0097] As one embodiment, the first type of symbol is configured as DL or Flexible by higher layer parameters.
- [0098] As one embodiment, the first type of symbol is configured as DL by higher layer parameters, and one or more subcarriers in the first type of symbol are used for UL transmission.
- [0099] As one embodiment, the first type of symbol is configured as DL by higher layer parameters, and one or more RBs in the first type of symbol are used for UL transmission.
- [0100] As one embodiment, the first type of symbol is configured as DL by higher layer parameters, and the first type of symbol supports UL transmission.
- [0101] As one embodiment, if one symbol is configured or indicated as the first type, the one symbol is used for a full duplex/SBFD mode.
- [0102] As one embodiment, if one symbol is configured or indicated as the first type, the one symbol is simultaneously used for uplink and downlink.
- [0103] As one embodiment, if one symbol is configured or indicated as the first type, the one symbol is used for uplink on one part of RBs and for downlink on another part of RBs.
- [0104] As one sub-embodiment of the above embodiment, the part of RBs and the another part of RBs belong to the same serving cell.
- [0105] As one sub-embodiment of the above embodiment, the part of RBs and the another part of RBs belong to the same Bandwidth part (BWP).
- [0106] As one embodiment, if one symbol is configured or indicated as a type different from the first type, the one symbol is not used for a full duplex/SBFD mode.
- [0107] As one embodiment, if one symbol is configured or indicated as a type different from the first type, the one symbol is used only for uplink or only for downlink.
- [0108] As one embodiment, the first information block indicate the reference time domain

resource set by configuring a frequency domain resource used for uplink for symbols configured as DL or Flexible by higher layer parameters.

[0109] As one embodiment, the first information block indicate the reference time domain resource set by configuring a frequency domain resource used for uplink for symbols configured as DL by higher layer parameters.

[0110] As one embodiment, the higher layer parameter is an RRC parameter.

[0111] As one embodiment, the higher layer parameters comprise tdd-UL-DL-ConfigurationCommon.

[0112] As one embodiment, the higher layer parameters comprise tdd-UL-DL-ConfigurationDedicated.

[0113] As one embodiment, the higher layer parameters comprise tdd-UL-DL-ConfigurationCommon and tdd-UL-DL-ConfigurationDedicated.

[0114] As one embodiment, the higher layer parameters comprise at least one of tdd-UL-DL-ConfigurationCommon or tdd-UL-DL-ConfigurationDedicated.

[0115] As one embodiment, for the specific definitions of tdd-UL-DL-ConfigurationCommon and tdd-UL-DL-ConfigurationDedicated, see Chapter 11 of 3GPP TS38.213.

[0116] As one embodiment, the reference time domain resource set comprises one or more symbols.

[0117] As one embodiment, the reference time domain resource set comprises one symbol.

[0118] As one embodiment, the reference time domain resource set comprises a plurality of symbols.

[0119] As one embodiment, the reference time domain resource set comprises one or more symbols of which types are the first type.

[0120] As one embodiment, the reference time domain resource set is composed of one or more symbols of which types are the first type.

[0121] As one embodiment, the reference time domain resource set comprises at least one slot.

[0122] As one embodiment, the reference time domain resource set comprises at least one subframe.

[0123] As one embodiment, the symbol is a single carrier symbol.

[0124] As one embodiment, the symbol is a multi-carrier symbol.

[0125] As one embodiment, the multi-carrier symbol is an Orthogonal Frequency Division Multiplexing (OFDM) symbol.

[0126] As one embodiment, the multi-carrier symbol is obtained after the output of transform precoding undergoes OFDM symbol generation.

[0127] As one embodiment, the multi-carrier symbol is a Single Carrier-Frequency Division

Multiple Access (SC-FDMA) symbol.

[0128] As one embodiment, the multi-carrier symbol is a Discrete Fourier Transform Spread OFDM (DFT-S-OFDM) symbol.

[0129] As one embodiment, the multi-carrier symbol is an FBMC (Filter Bank Multi Carrier) symbol.

[0130] As one embodiment, the multi-carrier symbol comprises a CP (Cyclic Prefix).

[0131] As one embodiment, the reference time domain resource set comprises symbols simultaneously used for the uplink transmission and the downlink transmission.

[0132] As one embodiment, any symbol in the reference time domain resource set can be simultaneously used for the uplink transmission and the downlink transmission.

[0133] As one embodiment, any symbol in the reference time domain resource set is simultaneously used for the uplink transmission and the downlink transmission.

[0134] As one embodiment, at least one symbol in the reference time domain resource set is simultaneously used for the uplink transmission and the downlink transmission.

[0135] As one embodiment, at least one symbol in the reference time domain resource set is configured for both uplink and downlink.

[0136] As one embodiment, at least one symbol in the reference time domain resource set is used for both uplink and downlink.

[0137] As one embodiment, each symbol in the reference time domain resource set is simultaneously used for uplink transmission and downlink transmission.

[0138] As one embodiment, each symbol in the reference time domain resource set is configured for both uplink and downlink.

[0139] As one embodiment, each symbol in the reference time domain resource set is used for both uplink and downlink.

[0140] As one embodiment, at least one symbol in the reference time domain resource set is configured for uplink in a part of RBs and for downlink in another part of RBs.

[0141] As one embodiment, at least one symbol in the reference time domain resource set is used for uplink in a part of RBs and for downlink in another part of RBs.

[0142] As one embodiment, each symbol in the reference time domain resource set is configured for uplink in a part of RBs and for downlink in another part of RBs.

[0143] As one embodiment, each symbol in the reference time domain resource set is used for uplink in a part of RBs and for downlink in another part of RBs.

[0144] As one embodiment, at least one symbol in the reference time domain resource set is configured, in one serving cell, for uplink in a part of RBs and for downlink in another part of RBs.

[0145] As one embodiment, at least one symbol in the reference time domain resource set is used, in one serving cell, for uplink in a part of RBs and for downlink in another part of RBs.

[0146] As one embodiment, each symbol in the reference time domain resource set is configured, in one serving cell, for uplink in a part of RBs and for downlink in another part of RBs.

[0147] As one embodiment, each symbol in the reference time domain resource set is used, in one serving cell, for uplink in a part of RBs and for downlink in another part of RBs.

[0148] As one embodiment, at least one symbol in the reference time domain resource set is configured, in one BWP, for uplink in a part of RBs and for downlink in another part of RBs.

[0149] As one embodiment, at least one symbol in the reference time domain resource set is used, in one BWP, for uplink in a part of RBs and for downlink in another part of RBs.

[0150] As one embodiment, each symbol in the reference time domain resource set is configured, in one BWP, for uplink in a part of RBs and for downlink in another part of RBs.

[0151] As one embodiment, each symbol in the reference time domain resource set is used, in one BWP, for uplink in a part of RBs and for downlink in another part of RBs.

[0152] As one embodiment, any symbol in the reference time domain resource set is configured as DL by higher layer parameters.

[0153] As one embodiment, any symbol in the reference time domain resource set is configured as DL or Flexible by higher layer parameters.

[0154] As one embodiment, each symbol in the reference time domain resource set is configured as DL by higher layer parameters.

[0155] As one embodiment, each symbol in the reference time domain resource set is configured as DL or Flexible by higher layer parameters.

[0156] As one embodiment, the reference time domain resource set comprises a plurality of symbols, at least one symbol in the reference time domain resource set is configured as DL by higher layer parameters, and at least one symbol in the reference time domain resource set is configured as Flexible by higher layer parameters.

[0157] As one embodiment, the reference time domain resource set is configured for one serving cell; and on the one serving cell, in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters, at least one subcarrier or at least one RB is used for uplink transmission.

[0158] As one embodiment, the reference time domain resource set is configured for at least one BWP; and on the at least one BWP, in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters, at least one subcarrier or at least one RB is used for uplink transmission.

[0159] As one embodiment, the reference time domain resource set is configured for one BWP; and on the one BWP, in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters, at least one subcarrier or at least one RB is used for uplink transmission.

[0160] As one embodiment, the reference time domain resource set is configured for a pair of BWPs (a DL BWP and a UL BWP), and on the UL BWP of the pair of BWPs (the DL BWP and the UL BWP), in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters, at least one subcarrier or at least one RB is used for uplink transmission.

[0161] As one embodiment, the reference time domain resource set is configured for one DL BWP; a first UL BWP is the UL BWP in a pair of BWPs (a DL BWP and a UL BWP) to which the one DL BWP belongs; and on the first UL BWP, in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters, at least one subcarrier or at least one RB is used for uplink transmission.

[0162] As one embodiment, the reference time domain resource set is configured for one serving cell; and on the one serving cell, in each of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters, at least one subcarrier or at least one RB is used for uplink transmission.

[0163] As one embodiment, the reference time domain resource set is configured for at least one BWP; and on the at least one BWP, in each of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters, at least one subcarrier or at least one RB is used for uplink transmission.

[0164] As one embodiment, the reference time domain resource set is configured for one BWP; and on the one BWP, in each of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters, at least one subcarrier or at least one RB is used for uplink transmission.

[0165] As one embodiment, the reference time domain resource set is configured for a pair of BWPs (a DL BWP and a UL BWP), and on the UL BWP of the pair of BWPs (the DL BWP and the UL BWP), in each of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters, at least one subcarrier or at least one RB is used for uplink transmission.

[0166] As one embodiment, the reference time domain resource set is configured for one DL BWP; the first UL BWP is the UL BWP in a pair of BWPs (a DL BWP and a UL BWP) to which the one DL BWP belongs; and on the first UL BWP, in each of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters, at least one

subcarrier or at least one RB is used for uplink transmission.

[0167] As one embodiment, the RB comprises a positive integer number of subcarriers.

[0168] As one embodiment, the RB comprises a positive integer number of consecutive subcarriers.

[0169] As one embodiment, the RB comprises 12 consecutive subcarriers.

[0170] As one embodiment, for the specific definitions of the RB, see Chapter 4 of 3GPP TS 38.211.

[0171] As one embodiment, the one serving cell is a cell in which the first information block is transmitted.

[0172] As one embodiment, the one serving cell is a cell in which the first information block is configured.

[0173] As one embodiment, the one serving cell is a cell in which the first information block is applied.

[0174] As one embodiment, the one serving cell is a cell that comprises the first information block.

[0175] As one embodiment, the at least one BWP is a BWP in the one serving cell.

[0176] As one embodiment, the at least one BWP belongs to the one serving cell.

[0177] As one embodiment, the one BWP is one BWP in the one serving cell.

[0178] As one embodiment, the pair of BWPs (the DL BWP and the UL BWP) is a pair of BWPs (a DL BWP and a UL BWP) in the one serving cell.

[0179] As one embodiment, the reference time domain resource set comprises symbols used for full duplex/SBFD.

[0180] As one embodiment, each symbol in the reference time domain resource set is used for full duplex/SBFD.

[0181] As one embodiment, any symbol that does not belong to the reference time domain resource set is used only for uplink or used only for downlink.

[0182] As one embodiment, any symbol that does not belong to the reference time domain resource set is configured only for uplink or configured only for downlink.

[0183] As one embodiment, any symbol that does not belong to the reference time domain resource set is used, in the one serving cell, only for uplink or only for downlink.

[0184] As one embodiment, any symbol that does not belong to the reference time domain resource set is configured, in the one serving cell, only for uplink or only for downlink.

[0185] As one embodiment, any symbol that does not belong to the reference time domain resource set is used, in the at least one BWP, only for uplink or only for downlink.

[0186] As one embodiment, any symbol that does not belong to the reference time domain

resource set is configured, in the at least one BWP, only for uplink or only for downlink.

[0187] As one embodiment, any symbol that does not belong to the reference time domain resource set is used, in the one BWP, only for uplink or only for downlink.

[0188] As one embodiment, any symbol that does not belong to the reference time domain resource set is configured, in the one BWP, only for uplink or only for downlink.

[0189] As one embodiment, any symbol that does not belong to the reference time domain resource set is used only for uplink on the UL BWP of the pair of BWPs (the DL BWP and the UL BWP), and is used only for downlink on the DL BWP of the pair of BWPs (the DL BWP and the UL BWP).

[0190] As one embodiment, any symbol that does not belong to the reference time domain resource set is configured only for uplink on the UL BWP of the pair of BWPs (the DL BWP and the UL BWP), and is configured only for downlink on the DL BWP of the pair of BWPs (the DL BWP and the UL BWP).

[0191] As one embodiment, the first PRACH occasion is one PRACH occasion.

[0192] As one embodiment, the first PRACH occasion is one valid PRACH occasion.

[0193] As one sub-embodiment of the above embodiment, the meaning of the "valid PRACH occasion" comprises: a PRACH occasion that may be used for transmitting a random access preamble.

[0194] As one sub-embodiment of the above embodiment, the meaning of the "valid PRACH occasion" comprises: a PRACH occasion that is allowed to be used for transmitting a random access preamble.

[0195] As one sub-embodiment of the above embodiment, the meaning of the "valid PRACH occasion" comprises: only when one PRACH occasion is the valid PRACH occasion, the PRACH occasion can be used for transmitting a random access preamble.

[0196] As one embodiment, the first PRACH occasion is one transmission occasion.

[0197] As one embodiment, the first PRACH occasion is a transmission occasion of one random access preamble.

[0198] As one embodiment, the first PRACH occasion is an available transmission occasion of one random access preamble.

[0199] As one embodiment, the first PRACH occasion is a valid transmission occasion of one random access preamble.

[0200] As one embodiment, the first PRACH occasion is one transmission occasion of one random access preamble.

[0201] As one embodiment, the first PRACH occasion is one transmission of one random access preamble.

- [0202] As one embodiment, the first PRACH occasion comprises a resource occupied by one transmission of one random access preamble.
- [0203] As one embodiment, the first PRACH occasion is a resource occupied by one transmission of one random access preamble.
- [0204] As one embodiment, the first PRACH occasion comprises a time resource occupied by one transmission of one random access preamble.
- [0205] As one embodiment, the first PRACH occasion is a time resource occupied by one transmission of one random access preamble.
- [0206] As one embodiment, the first PRACH occasion comprises a frequency resource occupied by one transmission of one random access preamble.
- [0207] As one embodiment, the first PRACH occasion is a frequency resource occupied by one transmission of one random access preamble.
- [0208] As one embodiment, the first PRACH occasion comprises a time resource and a frequency resource that are occupied by one transmission of one random access preamble.
- [0209] As one embodiment, the first PRACH occasion is a time resource and a frequency resource that are occupied by one transmission of one random access preamble.
- [0210] As one embodiment, the first PRACH occasion comprises a resource that may be occupied by one transmission of one random access preamble.
- [0211] As one embodiment, the first PRACH occasion is a resource that may be occupied by one transmission of one random access preamble.
- [0212] As one embodiment, the first PRACH occasion comprises a time resource that may be occupied by one transmission of one random access preamble.
- [0213] As one embodiment, the first PRACH occasion is a time resource that may be occupied by one transmission of one random access preamble.
- [0214] As one embodiment, the first PRACH occasion comprises a frequency resource that may be occupied by one transmission of one random access preamble.
- [0215] As one embodiment, the first PRACH occasion is a frequency resource that may be occupied by one transmission of one random access preamble.
- [0216] As one embodiment, the first PRACH occasion comprises a time resource and a frequency resource that may be occupied by one transmission of one random access preamble.
- [0217] As one embodiment, the first PRACH occasion is a time resource and a frequency resource that may be occupied by one transmission of one random access preamble.
- [0218] As one embodiment, the first PRACH occasion is a transmission occasion of the first random access preamble.
- [0219] As one embodiment, the first PRACH occasion is an available transmission occasion of

the first random access preamble.

[0220] As one embodiment, the first PRACH occasion is a valid transmission occasion of the first random access preamble.

[0221] As one embodiment, the first PRACH occasion is one transmission occasion of the first random access preamble.

[0222] As one embodiment, the first PRACH occasion comprises a resource occupied for transmitting the first random access preamble.

[0223] As one embodiment, the first PRACH occasion is a resource occupied for transmitting the first random access preamble.

[0224] As one embodiment, the first PRACH occasion comprises a time resource occupied for transmitting the first random access preamble.

[0225] As one embodiment, the first PRACH occasion is a time resource occupied for transmitting the first random access preamble.

[0226] As one embodiment, the first PRACH occasion comprises a frequency resource occupied for transmitting the first random access preamble.

[0227] As one embodiment, the first PRACH occasion is a frequency resource occupied for transmitting the first random access preamble.

[0228] As one embodiment, the first PRACH occasion comprises a time resource and a frequency resource that are occupied for transmitting the first random access preamble.

[0229] As one embodiment, the first PRACH occasion is a time resource and a frequency resource that are occupied for transmitting the first random access preamble.

[0230] As one embodiment, the transmitting comprises: sending.

[0231] As one embodiment, the transmitting refers to: sending.

[0232] As one embodiment, the first random access preamble is one random access preamble.

[0233] As one embodiment, formats of the first random access preamble comprise: Format 0, Format 1, Format 2, and Format 3.

[0234] As one embodiment, a format of the first random access preamble is one of Format 0, Format 1, Format 2, and Format 3.

[0235] As one embodiment, formats of the first random access preamble comprise: Format A1, Format A2, Format A3, Format B1, Format B2, Format B3, Format B4, Format C0, and Format C2.

[0236] As one embodiment, a format of the first random access preamble is one of Format A1, Format A2, Format A3, Format B1, Format B2, Format B3, Format B4, Format C0, and Format C2.

[0237] As one embodiment, formats of the first random access preamble further comprise:

Format A1/B1, Format A2/B2, and Format A3/B3.

[0238] As one embodiment, a format of the first random access preamble is one of Format A1/B1, Format A2/B2, and Format A3/B3.

[0239] As one embodiment, for the specific definitions of a format of the first random access preamble mentioned above, see Chapter 6.3.3 of 3GPP TS 38.211.

[0240] As one embodiment, a first root sequence set is used for generating N random access preambles.

[0241] As one embodiment, the N is an integer.

[0242] As one embodiment, the N is a positive integer.

[0243] As one embodiment, a value of the N is not greater than 64.

[0244] As one embodiment, a value of the N is equal to 64.

[0245] As one embodiment, the first random access preamble is one random access preamble of the N random access preambles.

[0246] As one embodiment, which one random access preamble of the N random access preambles that is the first random access preamble is selected by a MAC entity.

[0247] As one embodiment, which one random access preamble of the N random access preambles that is the first random access preamble is selected by a MAC entity of the first node.

[0248] As one embodiment, which one random access preamble of the N random access preambles that is the first random access preamble is randomly selected by a MAC entity of the first node.

[0249] As one embodiment, which one random access preamble of the N random access preambles that is the first random access preamble is randomly selected with equal probability by a MAC entity of the first node.

[0250] As one embodiment, which one random access preamble of the N random access preambles that is the first random access preamble is configured by a third higher layer parameter.

[0251] As one embodiment, a name of the third higher layer parameter comprises an "ra-Preamble".

[0252] As one embodiment, the third higher layer parameter is an ra-PreambleStartIndex.

[0253] As one embodiment, the third higher layer parameter is an ra-PreambleIndex.

[0254] As one embodiment, the first root sequence set comprises one or more root sequences.

[0255] As one embodiment, the first root sequence set comprises only one root sequence.

[0256] As one embodiment, the first root sequence set comprises a plurality of root sequences.

[0257] As one embodiment, lengths of root sequences in the first root sequence set are the same.

[0258] As one embodiment, lengths of root sequences in the first root sequence set are L.

- [0259] As one embodiment, a length of each root sequence in the first root sequence set is L.
- [0260] As one embodiment, the L is a positive integer.
- [0261] As one embodiment, a value of the L is one of 839, 139, 1151, and 571.
- [0262] As one embodiment, a value of the L is 839.
- [0263] As one embodiment, a value of the L is 139.
- [0264] As one embodiment, the L is configured by a second higher layer parameter.
- [0265] As one embodiment, root sequences in the first root sequence set have consecutive logical indexes.
- [0266] As one embodiment, a value range of the logical indexes is consecutive integers from 0 to (the L-2).
- [0267] As one embodiment, a logical index of a root sequence having the smallest logical index in the first root sequence set is configured by the second higher layer parameter.
- [0268] As one embodiment, a name of the second higher layer parameter comprises a "RootSequenceIndex".
- [0269] As one embodiment, a name of the second higher layer parameter comprises a "rootSequenceIndex".
- [0270] As one embodiment, the second higher layer parameter comprises one of a prach-RootSequenceIndex, a rootSequenceIndex-BFR or a msgA-PRACH-RootSequenceIndex.
- [0271] As one embodiment, the second higher layer parameter is a prach-RootSequenceIndex.
- [0272] As one embodiment, the second higher layer parameter is a rootSequenceIndex-BFR.
- [0273] As one embodiment, the second higher layer parameter is a msgA-PRACH-RootSequenceIndex.
- [0274] As one embodiment, the number of root sequences included in the first root sequence set is sufficient to generate the N random access preambles.
- [0275] As one embodiment, the number of root sequences included in the first root sequence set is a minimum number sufficient to generate the N random access preambles.
- [0276] As one embodiment, root sequences in the first root sequence set generate the N random access preambles through a cyclic shift.
- [0277] As one embodiment, one root sequence in the first root sequence set is one random access preamble.
- [0278] As one embodiment, one root sequence in the first root sequence set generates one random access preamble through one cyclic shift.
- [0279] As one embodiment, one root sequence in the first root sequence set generates v random access preambles through v cyclic shifts, respectively, and the v is a positive integer.
- [0280] As one embodiment, starting from a root sequence having the smallest logical index in

the first root sequence set, root sequences in the first root sequence set are incremented according to a logical index, and random access preambles are generated in sequence through a cyclic shift until the N random access preambles are generated.

[0281] As one embodiment, any root sequence in the first root sequence set is a pseudo-random sequence.

[0282] As one embodiment, any root sequence in the first root sequence set is a Zadoff-Chu (ZC) sequence.

[0283] As one embodiment, for the specific definitions of ra-PreambleIndex, ra-PreambleStartIndex, prach-RootSequenceIndex, rootSequenceIndex-BFR, and msgA-PRACH-RootSequenceIndex, see Chapter 6.3.2 of 3GPP TS 38.331. For the specific process of generating a random access preamble, see Chapter 6.3.3 of 3GPP TS 38.211.

[0284] As one embodiment, a candidate set of the first PRACH occasions is one of the first PRACH occasion set or the second PRACH occasion set.

[0285] As one embodiment, a candidate set of the first PRACH occasions is the first PRACH occasion set, and the first PRACH occasion is one PRACH occasion in the first PRACH occasion set.

[0286] As one embodiment, a candidate set of the first PRACH occasions is the second PRACH occasion set, and the first PRACH occasion is one PRACH occasion in the second PRACH occasion set.

[0287] As one embodiment, the first PRACH occasion set comprises at least one PRACH occasion.

[0288] As one embodiment, the first PRACH occasion set comprises at least one valid PRACH occasion.

[0289] As one embodiment, the second PRACH occasion set comprises at least one PRACH occasion.

[0290] As one embodiment, the second PRACH occasion set comprises at least one valid PRACH occasion.

[0291] As one embodiment, the first PRACH occasion set is configured by higher layer signaling.

[0292] As one embodiment, the first PRACH occasion set is configured by RRC signaling.

[0293] As one embodiment, the first PRACH occasion set is configured by some or all of fields in one RRC IE.

[0294] As one embodiment, the first PRACH occasion set is configured by some or all of fields of each RRC IE of a plurality of RRC IEs.

[0295] As one embodiment, the first PRACH occasion set is configured by one or more RRC

IEs.

[0296] As one embodiment, a name of an RRC IE that configures the first PRACH occasion set comprises "RACH-Config".

[0297] As one embodiment, a name of an RRC IE that configures the first PRACH occasion set comprises "RACH-ConfigGeneric".

[0298] As one embodiment, an RACH-ConfigGeneric IE configures the first PRACH occasion set.

[0299] As one embodiment, an RACH-ConfigGenericTwoStepRA IE configures the first PRACH occasion set.

[0300] As one embodiment, the second PRACH occasion set is configured by higher layer signaling.

[0301] As one embodiment, the second PRACH occasion set is configured by RRC signaling.

[0302] As one embodiment, the second PRACH occasion set is configured by some or all of fields in one RRC IE.

[0303] As one embodiment, the second PRACH occasion set is configured by some or all of fields of each RRC IE of a plurality of RRC IEs.

[0304] As one embodiment, the second PRACH occasion set is configured by one or more RRC IEs.

[0305] As one embodiment, a name of an RRC IE that configures the second PRACH occasion set comprises "RACH-Config".

[0306] As one embodiment, a name of an RRC IE that configures the second PRACH occasion set comprises "RACH-ConfigGeneric".

[0307] As one embodiment, a RACH-ConfigGeneric IE configures the second PRACH occasion set.

[0308] As one embodiment, a RACH-ConfigGenericTwoStepRA IE configures the second PRACH occasion set.

[0309] As one embodiment, the first PRACH occasion set and the second PRACH occasion set are configured by the same RRC IE.

[0310] As one embodiment, the first PRACH occasion set and the second PRACH occasion set are configured by the same RACH-ConfigGeneric IE.

[0311] As one embodiment, the first PRACH occasion set and the second PRACH occasion set are configured by the same RACH-ConfigGenericTwoStepRA IE.

[0312] As one embodiment, the first PRACH occasion set and the second PRACH occasion set are configured by different RRC IEs.

[0313] As one embodiment, the first PRACH occasion set and the second PRACH occasion set

are configured by two different RACH-ConfigGeneric IEs.

[0314] As one embodiment, the first PRACH occasion set and the second PRACH occasion set are configured by two different RACH-ConfigGenericTwoStepRA IEs.

[0315] As one embodiment, some or all of PRACH occasions in the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain.

[0316] As one embodiment, all PRACH occasions in the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain.

[0317] As one embodiment, at least one PRACH occasion in the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain.

[0318] As one embodiment, a slot in which at least one PRACH occasion in the first PRACH occasion set is located and the reference time domain resource set are orthogonal in the time domain.

[0319] As one embodiment, a symbol occupied by at least one PRACH occasion in the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain.

[0320] As one embodiment, a symbol occupied by at least one PRACH occasion in the first PRACH occasion set does not belong to the reference time domain resource set.

[0321] As one embodiment, any PRACH occasion in the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain.

[0322] As one embodiment, a slot in which any PRACH occasion in the first PRACH occasion set is located and the reference time domain resource set are orthogonal in the time domain.

[0323] As one embodiment, a symbol occupied by any PRACH occasion in the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain.

[0324] As one embodiment, a symbol occupied by any PRACH occasion in the first PRACH occasion set does not belong to the reference time domain resource set.

[0325] As one embodiment, some or all of PRACH occasions in the second PRACH occasion set and the reference time domain resource set overlap in the time domain.

[0326] As one embodiment, all PRACH occasions in the second PRACH occasion set and the reference time domain resource set overlap in the time domain.

[0327] As one embodiment, the second PRACH occasion set belongs to the reference time domain resource set.

[0328] As one embodiment, at least one PRACH occasion in the second PRACH occasion set belongs to the reference time domain resource set in the time domain, and at least one PRACH occasion in the second PRACH occasion set and the reference time domain resource set are orthogonal in the time domain.

- [0329] As one embodiment, at least one PRACH occasion in the second PRACH occasion set and the reference time domain resource set overlap in the time domain.
- [0330] As one embodiment, a slot in which at least one PRACH occasion in the second PRACH occasion set is located and the reference time domain resource set overlap in the time domain.
- [0331] As one embodiment, a symbol occupied by at least one PRACH occasion in the second PRACH occasion set and the reference time domain resource set overlap in the time domain.
- [0332] As one embodiment, some or all of symbols occupied by at least one PRACH occasion in the second PRACH occasion set and the reference time domain resource set overlap in the time domain.
- [0333] As one embodiment, only a part of symbols occupied by at least one PRACH occasion in the second PRACH occasion set and the reference time domain resource set overlap in the time domain.
- [0334] As one embodiment, a symbol occupied by at least one PRACH occasion in the second PRACH occasion set belongs to the reference time domain resource set.
- [0335] As one embodiment, any PRACH occasion in the second PRACH occasion set and the reference time domain resource set overlap in the time domain.
- [0336] As one embodiment, a slot in which any PRACH occasion in the second PRACH occasion set is located and the reference time domain resource set overlap in the time domain.
- [0337] As one embodiment, a symbol occupied by any PRACH occasion in the second PRACH occasion set and the reference time domain resource set overlap in the time domain.
- [0338] As one embodiment, some or all of symbols occupied by any PRACH occasion in the second PRACH occasion set and the reference time domain resource set overlap in the time domain.
- [0339] As one embodiment, only a part of symbols occupied by any PRACH occasion in the second PRACH occasion set and the reference time domain resource set overlap in the time domain.
- [0340] As one embodiment, a symbol occupied by any PRACH occasion in the second PRACH occasion set belongs to the reference time domain resource set.
- [0341] As one embodiment, the reference time domain resource set is configured for one serving cell, and both the first PRACH occasion set and the second PRACH occasion set belong to the one serving cell.
- [0342] As one embodiment, the reference time domain resource set is configured for one serving cell, and both the first PRACH occasion set and the second PRACH occasion set belong to the same BWP in the one serving cell.
- [0343] As one embodiment, the reference time domain resource set is configured for one

serving cell, and both the first PRACH occasion set and the second PRACH occasion set belong to the same UL BWP in the one serving cell.

[0344] As one embodiment, the reference time domain resource set is configured for at least one BWP, and both the first PRACH occasion set and the second PRACH occasion set belong to the at least one BWP.

[0345] As one embodiment, the reference time domain resource set is configured for at least one BWP, and both the first PRACH occasion set and the second PRACH occasion set belong to the same BWP of the at least one BWP.

[0346] As one embodiment, the reference time domain resource set is configured for one BWP, and both the first PRACH occasion set and the second PRACH occasion set belong to the one BWP.

[0347] As one embodiment, the reference time domain resource set is configured for a pair of BWPs (a DL BWP and a UL BWP), and both the first PRACH occasion set and the second PRACH occasion set belong to the UL BWP of the pair of BWPs (the DL BWP and the UL BWP).

[0348] As one embodiment, the reference time domain resource set is configured for one DL BWP, both the first PRACH occasion set and the second PRACH occasion set belong to the same UL BWP, and the same UL BWP and the one DL BWP are a pair of BWPs (a DL BWP and a UL BWP).

[0349] As one embodiment, center frequencies of a DL BWP and a UL BWP in a pair of BWPs (the DL BWP and the UL BWP) are aligned.

[0350] As one embodiment, center frequencies of a DL BWP and a UL BWP in a pair of BWPs (the DL BWP and the UL BWP) are the same.

[0351] As one embodiment, center frequencies of a DL BWP and a UL BWP in a pair of BWPs (the DL BWP and the UL BWP) are aligned, and the number of subcarriers included in the DL BWP of the pair of BWPs (the DL BWP and the UL BWP) is different from the number of subcarriers included in the UL BWP of the pair of BWPs (the DL BWP and the UL BWP).

[0352] As one embodiment, center frequencies of a DL BWP and a UL BWP in a pair of BWPs (the DL BWP and the UL BWP) are aligned, and the number of subcarriers included in the DL BWP of the pair of BWPs (the DL BWP and the UL BWP) is the same as the number of subcarriers included in the UL BWP of the pair of BWPs (the DL BWP and the UL BWP).

[0353] As one embodiment, center frequencies of a DL BWP and a UL BWP in a pair of BWPs (the DL BWP and the UL BWP) are aligned, and the number of subcarriers included in the DL BWP of the pair of BWPs (the DL BWP and the UL BWP) is greater than the number of subcarriers included in the UL BWP of the pair of BWPs (the DL BWP and the UL BWP).

[0354] As one embodiment, center frequencies of a DL BWP and a UL BWP in a pair of BWPs

(the DL BWP and the UL BWP) are aligned, and the number of subcarriers included in the DL BWP of the pair of BWPs (the DL BWP and the UL BWP) is smaller than the number of subcarriers included in the UL BWP of the pair of BWPs (the DL BWP and the UL BWP).

[0355] As one embodiment, center frequencies of a DL BWP and a UL BWP in a pair of BWPs (the DL BWP and the UL BWP) are aligned, and the number of RBs included in the DL BWP of the pair of BWPs (the DL BWP and the UL BWP) is different from the number of RBs included in the UL BWP of the pair of BWPs (the DL BWP and the UL BWP).

[0356] As one embodiment, center frequencies of a DL BWP and a UL BWP in a pair of BWPs (the DL BWP and the UL BWP) are aligned, and the number of RBs included in the DL BWP of the pair of BWPs (the DL BWP and the UL BWP) is the same as the number of RBs included in the UL BWP of the pair of BWPs (the DL BWP and the UL BWP).

[0357] As one embodiment, center frequencies of a DL BWP and a UL BWP in a pair of BWPs (the DL BWP and the UL BWP) are aligned, and the number of RBs included in the DL BWP of the pair of BWPs (the DL BWP and the UL BWP) is greater than the number of RBs included in the UL BWP of the pair of BWPs (the DL BWP and the UL BWP).

[0358] As one embodiment, center frequencies of a DL BWP and a UL BWP in a pair of BWPs (the DL BWP and the UL BWP) are aligned, and the number of RBs included in the DL BWP of the pair of BWPs (the DL BWP and the UL BWP) is smaller than the number of RBs included in the UL BWP of the pair of BWPs (the DL BWP and the UL BWP).

[0359] As one embodiment, the transmission of the first random access preambles belongs to one of the first type of random access process or the second type of random access process.

[0360] As one embodiment, the transmission of the first random access preambles belongs only to one of the first type of random access process or the second type of random access process.

[0361] As one embodiment, the transmission of the first random access preambles belongs to the first type of random access process.

[0362] As one embodiment, the transmission of the first random access preambles belongs to the second type of random access process.

[0363] As one embodiment, the first type of random access process is contention based.

[0364] As one embodiment, the second type of random access process is contention free.

[0365] As one embodiment, the first type of random access process is contention free.

[0366] As one embodiment, the second type of random access process is contention based.

[0367] As one embodiment, the first type of random access process is a four-step (4-step) random access process.

[0368] As one embodiment, the second type of random access process is a two-step (2-step) random access process.

- [0369] As one embodiment, the first type of random access process is a two-step random access process.
- [0370] As one embodiment, the second type of random access process is a four-step random access process.
- [0371] As one embodiment, the first type of random access process is a Type-1 random access process.
- [0372] As one embodiment, the second type of random access process is a Type-2 random access process.
- [0373] As one embodiment, the first type of random access process is a Type-2 random access process.
- [0374] As one embodiment, the second type of random access process is a Type-1 random access process.
- [0375] As one embodiment, for the specific definitions of a Type-1 random access process and a Type-2 random access process, see Chapter 8 of 3GPP TS 38.213.
- [0376] As one embodiment, the first type of random access process and the second type of random access process have different priorities.
- [0377] As one embodiment, a priority of the second type of random access process is higher than that of the first type of random access process.
- [0378] As one embodiment, a priority of any random access process of the second type of random access process is higher than a priority of any random access process of the first type of random access process.
- [0379] As one embodiment, an event set that initiates the first type of random access process is different from an event set that initiates the second type of random access process.
- [0380] As one embodiment, any event in an event set that initiates the second type of random access process does not belong to an event set that initiates the first type of random access process.
- [0381] As one embodiment, a feature to the first type of random access process is different from a feature to the second type of random access process.
- [0382] As one embodiment, any feature to the first type of random access process is not a feature to the second type of random access process.
- [0383] As one embodiment, the first type of random access process is applicable to at least one feature, the second type of random access process is applicable to at least one feature, and any feature of the at least one feature to the second type of random access process is not a feature of the at least one feature to the second type of random access process.
- [0384] As one embodiment, when the transmission of the first random access preambles belongs to the first type of random access process, a candidate set of the first PRACH occasions

is the first PRACH occasion set.

[0385] As one embodiment, the essence of the above method comprises: when the transmission of the first random access preambles belongs to the first type of random access process, the first PRACH occasions cannot occupy a time domain resource in the reference time domain resource set.

[0386] As one embodiment, the essence of the above method comprises: when the transmission of the first random access preambles belongs to the first type of random access process, the first PRACH occasions cannot occupy an SBFD symbol.

[0387] As one embodiment, the essence of the above method comprises: when the transmission of the first random access preambles belongs to the first type of random access process, the first random access preambles cannot be transmitted in an SBFD symbol.

[0388] As one embodiment, when the transmission of the first random access preambles belongs to the second type of random access process, a candidate set of the first PRACH occasions is the second PRACH occasion set.

[0389] As one embodiment, the essence of the above method comprises: when the transmission of the first random access preambles belongs to the second type of random access process, the first PRACH occasions are allowed to occupy a time domain resource in the reference time domain resource set.

[0390] As one embodiment, the essence of the above method comprises: when the transmission of the first random access preambles belongs to the second type of random access process, the first PRACH occasions are allowed to occupy an SBFD symbol.

[0391] As one embodiment, the essence of the above method comprises: when the transmission of the first random access preambles belongs to the second type of random access process, the first random access preambles are allowed to be transmitted in an SBFD symbol.

[0392] As one embodiment, the first receiver receives a Synchronization Signal/Physical Broadcast Channel (SS/PBCH) block.

[0393] As one embodiment, before transmitting the first random access preambles, the first receiver receives an SS/PBCH block.

[0394] As one embodiment, a random access process to which the transmission of the first random access preambles belongs comprises: transmitting the first random access preambles, receiving a random access response (RAR) to the first random access preambles, transmitting a Physical Uplink Shared Channel (PUSCH) scheduled by the random access response to the first random access preambles, and receiving a PDSCH for contention resolution.

[0395] As one embodiment, the first receiver receives a response to the first random access preambles.

[0396] As one embodiment, after transmitting the first random access preambles, the first receiver receives a response to the first random access preambles.

[0397] As one embodiment, the first transmitter transmits a PUSCH scheduled by a response to the first random access preambles.

[0398] As one embodiment, the first receiver receives a PDSCH for contention resolution.

[0399] As one embodiment, a random access process to which the transmission of the first random access preambles belongs comprises: transmitting the first random access preambles and one PUSCH, and receiving a random access response.

[0400] As one embodiment, the first transmitter transmits the first random access preambles and one PUSCH.

[0401] As one embodiment, the first receiver receives a random access response.

[0402] **Embodiment 2**

[0403] Embodiment 2 illustrates a schematic diagram of a network architecture according to one embodiment of the present application, as shown in FIG. 2.

[0404] FIG. 2 illustrates a network architecture 200 of Long-Term Evolution (LTE), Long-Term Evolution Advanced (LTE-A) and future 5G systems. The network architecture 200 of the LTE, LTE-A and future 5G systems is referred to as an Evolved Packet System (EPS) 200. The 5G NR or LTE network architecture 200 may be referred to as a 5G System (5GS)/Evolved Packet System (EPS) 200 or some other suitable terminologies. The 5GS/EPS 200 may comprise one or more pieces of User Equipment (UE) 201, one piece of UE241 performing sidelink communication with UE201, a Next Generation Radio Access Network (NG-RAN) 202, a 5G CoreNetwork (5GC)/Evolved Packet Core (EPC) 210, a Home Subscriber Server (HSS)/Unified Data Management (UDM) 220, and an Internet service 230. The 5GS/EPS200 may be interconnected with other access networks, but for simplicity, these entities/interfaces are not shown. As shown in FIG. 2, the 5GS/EPS200 provides a packet switching service, but those skilled in the art will readily appreciate that various concepts presented throughout the present application may be extended to networks providing a circuit switching service. The NG-RAN202 comprises a New Radio (NR) Node B (gNB) 203 and other gNB204. The gNB203 provides user and control plane protocol termination toward the UE201. The gNB203 may be connected to other gNB204 via an Xn interface (e.g., backhaul). The gNB203 may also be referred to as a base station, a base transceiver station, a radio base station, a radio transceiver, a transceiver function, a basic service set (BSS), an extended service set (ESS), a TRP (Transmitter Receiver Point), or some other suitable terminologies. The gNB203 provides an access point to 5GC/EPC210 for the UE201. Examples of the UE201 comprise a cellular phone, a smart phone, a session initiation protocol (SIP) phone, a laptop, a personal digital assistant (PDA), a satellite radio, a global positioning

system, a multimedia apparatus, a video apparatus, a digital audio player (e.g., an MP3 player), a camera, a game console, a drone, an aircraft, a narrowband Internet of Things device, a machine type communication device, a land vehicle, a car, a wearable device, or any other similar functional apparatus. Those skilled in the art may also refer to the UE201 as a mobile station, a subscriber station, a mobile unit, a subscriber unit, a wireless unit, a remote unit, a mobile apparatus, a wireless apparatus, a wireless communication apparatus, a remote apparatus, a mobile subscriber station, an access terminal, a mobile terminal, a wireless terminal, a remote terminal, a handset, a user agent, a mobile client, a client, or some other suitable terminologies. The gNB203 is connected to the 5GC/EPC210 by an S1/NG interface. The 5GC/EPC210 comprises Mobility Management Entity (MME)/Authentication Management Field (AMF)/Session Management Function (SMF) 211, other MME/AMF/SMF214, Service Gateway (S-GW)/User Plane Function (UPF) 212, and Packet Data Network Gateway (P-GW)/UPF213. The MME/AMF/SMF211 is a control node that handles signaling between the UE201 and the 5GC/EPC210. Generally, the MME/AMF/SMF211 provides bearer and connection management. All user Internet Protocol (IP) packets are transmitted through the S-GW/UPF212, and the S-GW/UPF212 itself is connected to the P-GW/UPF213. The P-GW provides UE IP address assignment and other functions. The P-GW/UPF213 is connected to the Internet service 230. The Internet service 230 comprises operator-corresponding Internet protocol services, which may specifically comprise Internet, intranet, an IP Multimedia Subsystem (IMS), and packet switching services.

[0405] As one embodiment, the first node in the present application comprises the UE201.

[0406] As one embodiment, the second node in the present application comprises the gNB203.

[0407] As one embodiment, a radio link between the UE201 and the gNB203 comprises a cellular network link.

[0408] As one embodiment, a sender of the first information block comprises the gNB203.

[0409] As one embodiment, a recipient of the first information block comprises the UE201.

[0410] As one embodiment, a sender of the second information block comprises the gNB203.

[0411] As one embodiment, a recipient of the second information block comprises the UE201.

[0412] As one embodiment, a recipient of the first random access preambles comprises the gNB203.

[0413] As one embodiment, a sender of the first random access preambles comprises the UE201.

[0414] As one embodiment, the gNB203 supports SBFD.

[0415] As one embodiment, the gNB203 supports a more flexible duplex mode or a full duplex mode.

[0416] As one embodiment, the UE201 supports SBFD.

[0417] As one embodiment, the UE201 supports a more flexible duplex mode or a full duplex mode.

[0418] **Embodiment 3**

[0419] Embodiment 3 illustrates a schematic diagram of an embodiment of a radio protocol architecture for a user plane and a control plane according to one embodiment of the present application, as shown in FIG. 3.

[0420] Embodiment 3 shows a schematic diagram of one embodiment of a radio protocol architecture for a user plane and a control plane according to the present application, as shown in FIG. 3. FIG. 3 is a schematic diagram illustrating an embodiment of a radio protocol architecture for a user plane 350 and a control plane 300. FIG. 3 shows the radio protocol architecture for the control plane 300 used between a first communication node device (UE, gNB or RSU in V2X) and a second communication node device (gNB, UE or RSU in V2X), or between two pieces of UE using three layers: Layer 1, Layer 2, and Layer 3. The Layer 1 (L1 layer) is the lowest layer and implements various PHY (physical layer) signal processing functions. The L1 layer will be referred to as PHY301 herein. Layer 2 (L2 layer) 305 is above the PHY301 and is responsible for a link between the first communication node device and the second communication node device, or between two pieces of UE. The L2 layer 305 comprises a Medium Access Control (MAC) sublayer 302, a Radio Link Control (RLC) sublayer 303, and a Packet Data Convergence Protocol (PDCP) sublayer 304, these sublayers terminating at the second communication node device. The PDCP sublayer 304 provides multiplexing between different radio bearers and logical channels. The PDCP sublayer 304 also provides security by encrypting data packets, and provides handover support for the first communication node device between the second communication node devices. The RLC sublayer 303 provides segmentation and reassembling of upper-layer data packets, retransmission of lost data packets, and reordering of data packets to compensate for out-of-order reception due to HARQ. The MAC sublayer 302 provides multiplexing between logical channels and transport channels. The MAC sublayer 302 is also responsible for assigning various radio resources (e.g., resource blocks) in one cell between the first communication node devices. The MAC sublayer 302 is also responsible for HARQ operations. A Radio Resource Control (RRC) sublayer 306 in the Layer 3 (L3 layer) in the control plane 300 is responsible for obtaining radio resources (i.e., radio bearers) and configuring a lower layer using RRC signaling between the second communication node device and the first communication node device. The radio protocol architecture for the user plane 350 comprises Layer 1 (L1 layer) and Layer 2 (L2 layer). The radio protocol architecture for the first communication node device and the second communication node device in the user plane 350 is substantially the same as that in corresponding layers and sublayers in the control plane 300 for a physical layer 351, a PDCP sublayer 354 in an L2 layer 355, an RLC

sublayer 353 in the L2 layer 355, and a MAC sublayer 352 in the L2 layer 355, but the PDCP sublayer 354 also provides header compression for the upper-layer data packets to reduce radio transmission overhead. The L2 layer 355 in the user plane 350 further comprises a Service Data Adaptation Protocol (SDAP) sublayer 356, and the SDAP sublayer 356 is responsible for mapping between a QoS flow and a data radio bearer (DRB) to support the diversity of services. Although not shown in the figure, the first communication node device may have several upper layers above the L2 layer 355, comprising a network layer (e.g., an IP layer) terminating at a P-GW on a network side and an application layer terminating at another end (e.g., remote UE and a server) of a connection.

[0421] As one embodiment, the radio protocol architecture in FIG. 3 is applicable to the first node in the present application.

[0422] As one embodiment, the radio protocol architecture in FIG. 3 is applicable to the second node in the present application.

[0423] As one embodiment, the higher layer in the present application refers to a layer above the physical layer.

[0424] As one embodiment, the first information block is generated in the RRC sublayer 306.

[0425] As one embodiment, the first information block is generated in the MAC sublayer 302 or the MAC sublayer 352.

[0426] As one embodiment, the first information block is generated in the PHY301 or the PHY351.

[0427] As one embodiment, the second information block is generated in the RRC sublayer 306.

[0428] As one embodiment, the second information block is generated in the MAC sublayer 302 or the MAC sublayer 352.

[0429] As one embodiment, the second information block is generated in the PHY301 or the PHY351.

[0430] As one embodiment, the first random access preambles are generated in the PHY301.

[0431] As one embodiment, the first random access preambles are generated in the PHY351.

[0432] **Embodiment 4**

[0433] Embodiment 4 illustrates a schematic diagram of a first communication device and a second communication device according to one embodiment of the present application, as shown in FIG. 4. FIG. 4 is a block diagram of a first communication device 410 and a second communication device 450 communicating with each other in an access network.

[0434] The first communication device 410 comprises a controller/processor 475, a memory 476, a receiving processor 470, a transmitting processor 416, a multi-antenna receiving processor

472, a multi-antenna transmitting processor 471, a transmitting device/receiving device 418, and an antenna 420.

[0435] The second communication device 450 comprises a controller/processor 459, a memory 460, a data source 467, a transmitting processor 468, a receiving processor 456, a multi-antenna transmitting processor 457, a multi-antenna receiving processor 458, a transmitting device/receiving device 454, and an antenna 452.

[0436] In the transmission from the first communication device 410 to the second communication device 450, at the first communication device 410, upper-layer data packets from a core network are provided to the controller/processor 475. The controller/processor 475 implements the functionality of the L2 layer. In DL, the controller/processor 475 provides header compression, encryption, packet segmentation and reordering, multiplexing between logical and transport channels, and radio resource assignment to the second communication device 450 based on various priority metrics. The controller/processor 475 is also responsible for HARQ operations, retransmission of lost packets, and signaling to the second communication device 450. The transmitting processor 416 and the multi-antenna transmitting processor 471 implement various signal processing functions for the L1 layer (i.e., physical layer). The transmitting processor 416 implements coding and interleaving to facilitate forward error correction (FEC) at the second communication device 450, as well as constellation mapping based on various modulation schemes (e.g., binary phase shift keying (BPSK), quadrature phase shift keying (QPSK), M-phase shift keying (M-PSK), and M-quadrature amplitude modulation (M-QAM)). The multi-antenna transmitting processor 471 performs digital spatial precoding, including codebook-based precoding and non-codebook-based precoding, and beamforming processing on coded and modulated symbols to generate one or more parallel streams. The transmitting processor 416 then maps each parallel stream to a subcarrier, multiplexes the modulated symbols with a reference signal (e.g., pilot) in the time domain and/or a frequency domain, and then uses an inverse fast Fourier transform (IFFT) to generate a physical channel carrying a time domain multi-carrier symbol stream. The multi-antenna transmitting processor 471 then performs transmitting analog precoding/beamforming operations on the time domain multi-carrier symbol stream. Each transmitting device 418 converts a baseband multi-carrier symbol stream provided by the multi-antenna transmitting processor 471 into a radio frequency stream, which is then provided to different antennas 420.

[0437] In the transmission from the first communication device 410 to the second communication device 450, at the second communication device 450, each receiving device 454 receives a signal through its corresponding antenna 452. Each receiving device 454 recovers information modulated onto a radio frequency carrier, and converts a radio frequency stream into

a baseband multi-carrier symbol stream and provides it to the receiving processor 456. The receiving processor 456 and the multi-antenna receiving processor 458 implement various signal processing functions of the L1 layer. The multi-antenna receiving processor 458 performs receiving analog precoding/beamforming operations on the baseband multi-carrier symbol stream from the receiving device 454. The receiving processor 456 uses a fast Fourier transform (FFT) to convert the baseband multi-carrier symbol stream from a time domain to a frequency domain after the receiving analog precoding/beamforming operation. In the frequency domain, a physical layer data signal and the reference signal are demultiplexed by the receiving processor 456, wherein the reference signal will be used for channel estimation, and the data signal undergoes multi-antenna detection in the multi-antenna receiving processor 458 to recover any parallel stream destined for the second communication device 450. Symbols on each parallel stream are demodulated and recovered in the receiving processor 456, and soft decisions are generated. The receiving processor 456 then decodes and deinterleaves the soft decisions to recover upper-layer data and control signals transmitted by the first communication device 410 on the physical channel. The upper-layer data and the control signals are then provided to the controller/processor 459. The controller/processor 459 implements functions of the L2 layer. The controller/processor 459 may be associated with the memory 460 that stores a program code and data. The memory 460 may be referred to as a computer-readable medium. In DL (DownLink), the controller/processor 459 provides demultiplexing between transmission and logical channels, packet reassembly, decryption, header decompression, and control signal processing to recover the upper-layer data packets from the core network. The upper-layer data packets are then provided to all protocol layers above the L2 layer. Various control signals may also be provided to L3 for L3 processing. The controller/processor 459 is also responsible for error detection using an acknowledgment (ACK) and/or negative acknowledgment (NACK) protocol to support HARQ operations.

[0438] In the transmission from the second communication device 450 to the first communication device 410, at the second communication device 450, the upper-layer data packets are provided to the controller/processor 459 using the data source 467. The data source 467 represents all protocol layers above the L2 layer. Similar to a transmission function at the first communication device 410 described in DL, the controller/processor 459 implements header compression, encryption, packet segmentation and reordering, and multiplexing between logical and transport channels based on radio resource assignment of the first communication device 410, and implements L2 layer functions for the user plane and the control plane. The controller/processor 459 is also responsible for HARQ operations, retransmission of lost packets, and signaling to the first communication device 410. The transmitting processor 468 executes modulation mapping and channel coding processing, and the multi-antenna transmitting processor

457 performs digital multi-antenna spatial precoding, including codebook-based precoding and non-codebook-based precoding, and beamforming processing. Then, the transmitting processor 468 modulates the generated parallel stream into a multi-carrier/single-carrier symbol stream, which is provided to different antennas 452 via the transmitting device 454 after undergoing analog precoding/beamforming operations in the multi-antenna transmitting processor 457. Each transmitting device 454 first converts a baseband symbol stream provided by the multi-antenna transmitting processor 457 into a radio frequency symbol stream, and then provides it to the antenna 452.

[0439] In the transmission from the second communication device 450 to the first communication device 410, a function at the first communication device 410 is similar to a receiving function at the second communication device 450 described in the transmission from the first communication device 410 to the second communication device 450. Each receiving device 418 receives a radio frequency signal through its corresponding antenna 420, converts the received radio frequency signal into a baseband signal, and provides the baseband signal to the multi-antenna receiving processor 472 and the receiving processor 470. The receiving processor 470 and the multi-antenna receiving processor 472 jointly implement functions of the L1 layer. The controller/processor 475 implements functions of the L2 layer. The controller/processor 475 may be associated with the memory 476 that stores a program code and data. The memory 476 may be referred to as a computer-readable medium. The controller/processor 475 provides multiplexing, packet reassembly, decryption, header decompression, and control signal processing between transmission and logical channels to recover upper-layer data packets from the second communication device 450. The upper-layer data packets from the controller/processor 475 may be provided to the core network. The controller/processor 475 is also responsible for error detection using the ACK and/or NACK protocol to support HARQ operations.

[0440] As one embodiment, the second communication device 450 comprises: at least one processor and at least one memory, wherein the at least one memory comprises a computer program code; and the at least one memory and the computer program code are configured to be used together with the at least one processor. The second communication device 450 apparatus at least: receives a first information block, wherein the first information block indicates a reference time domain resource set, and the reference time domain resource set comprises one or more symbols configured as DL by higher layer parameters; and transmits first random access preambles in first PRACH occasions, wherein a candidate set of the first PRACH occasions is a first PRACH occasion set or a second PRACH occasion set, the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain, and the second PRACH occasion set and the reference time domain resource set overlap in the time domain, wherein the transmission

of the first random access preambles belongs to one of a first type of random access process or a second type of random access process; when the transmission of the first random access preambles belongs to the first type of random access process, the candidate set of the first PRACH occasions is the first PRACH occasion set; and when the transmission of the first random access preambles belongs to the second type of random access process, the candidate set of the first PRACH occasions is the second PRACH occasion set.

[0441] As one embodiment, the second communication device 450 comprises: a memory that stores a computer-readable instruction program, wherein the computer-readable instruction program, when executed by at least one processor, generates actions, and the actions comprise: receiving a first information block, wherein the first information block indicates a reference time domain resource set, and the reference time domain resource set comprises one or more symbols configured as DL by higher layer parameters; and transmitting first random access preambles in first PRACH occasions, wherein a candidate set of the first PRACH occasions is a first PRACH occasion set or a second PRACH occasion set, the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain, and the second PRACH occasion set and the reference time domain resource set overlap in the time domain, wherein the transmission of the first random access preambles belongs to one of a first type of random access process or a second type of random access process; when the transmission of the first random access preambles belongs to the first type of random access process, the candidate set of the first PRACH occasions is the first PRACH occasion set; and when the transmission of the first random access preambles belongs to the second type of random access process, the candidate set of the first PRACH occasions is the second PRACH occasion set.

[0442] As one embodiment, the first communication device 410 comprises: at least one processor and at least one memory, the at least one memory comprising computer program codes; the at least one memory and the computer program codes are configured to be used together with the at least one processor. The first communication device 410 apparatus at least: transmits a first information block, wherein the first information block indicates a reference time domain resource set, and the reference time domain resource set comprises one or more symbols configured as DL by higher layer parameters; and receives first random access preambles in first PRACH occasions, wherein a candidate set of the first PRACH occasions is a first PRACH occasion set or a second PRACH occasion set, the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain, and the second PRACH occasion set and the reference time domain resource set overlap in the time domain, wherein the reception of the first random access preambles belongs to one of a first type of random access process or a second type of random access process; when the reception of the first random access preambles belongs to the first type

of random access process, the candidate set of the first PRACH occasions is the first PRACH occasion set; and when the reception of the first random access preambles belongs to the second type of random access process, the candidate set of the first PRACH occasions is the second PRACH occasion set.

[0443] As one embodiment, the first communication device 410 comprises: a memory that stores a computer-readable instruction program, wherein the computer-readable instruction program, when executed by at least one processor, generates actions, and the actions comprise: transmitting a first information block, wherein the first information block indicates a reference time domain resource set, and the reference time domain resource set comprises one or more symbols configured as DL by higher layer parameters; and receiving first random access preambles in first PRACH occasions, wherein a candidate set of the first PRACH occasions is a first PRACH occasion set or a second PRACH occasion set, the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain, and the second PRACH occasion set and the reference time domain resource set overlap in the time domain, wherein the reception of the first random access preambles belongs to one of a first type of random access process or a second type of random access process; when the reception of the first random access preambles belongs to the first type of random access process, the candidate set of the first PRACH occasions is the first PRACH occasion set; and when the reception of the first random access preambles belongs to the second type of random access process, the candidate set of the first PRACH occasions is the second PRACH occasion set.

[0444] As one embodiment, the first node in the present application comprises the second communication device 450.

[0445] As one embodiment, the second node in the present application comprises the first communication device 410.

[0446] As one embodiment, at least one of {the antenna 452, the receiving device 454, the receiving processor 456, the multi-antenna receiving processor 458, the controller/processor 459, the memory 460, and the data source 467} is used for receiving the first information block in the present application; and at least one of {the antenna 420, the transmitting device 418, the transmitting processor 416, the multi-antenna transmitting processor 471, the controller/processor 475, and the memory 476} is used for transmitting the first information block in the present application.

[0447] As one embodiment, at least one of {the antenna 452, the receiving device 454, the receiving processor 456, the multi-antenna receiving processor 458, the controller/processor 459, the memory 460, and the data source 467} is used for receiving the second information block in the present application; and at least one of {the antenna 420, the transmitting device 418, the

transmitting processor 416, the multi-antenna transmitting processor 471, the controller/processor 475, and the memory 476} is used for transmitting the second information block in the present application.

[0448] As one embodiment, at least one of {the antenna 452, the transmitting device 454, the transmitting processor 468, the multi-antenna transmitting processor 457, the controller/processor 459, and the memory 460} is used for transmitting the first random access preambles in the present application; and at least one of {the antenna 420, the receiving device 418, the receiving processor 470, the multi-antenna receiving processor 472, the controller/processor 475, and the memory 476} is used for receiving the first random access preambles in the present application.

[0449] **Embodiment 5**

[0450] Embodiment 5 illustrates a flow chart of transmission according to one embodiment of the present application, as shown in FIG. 5. In FIG. 5, a first node U01 and a second node N02 are respectively two communication nodes for transmission through an air interface, wherein steps in a dotted block F51 are optional.

[0451] For **the first node U01**, a first information block is received in step S5101; a second information block is received in step S5102; and first random access preambles are transmitted in first PRACH occasions in step S5103.

[0452] For **the second node N02**, a first information block is transmitted in step S5201; a second information block is transmitted in step S5202; and first random access preambles are received in first PRACH occasions in step S5203.

[0453] In Embodiment 5, the first information block indicates a reference time domain resource set, and the reference time domain resource set comprises one or more symbols configured as DL by higher layer parameters; and a candidate set of the first PRACH occasions is a first PRACH occasion set or a second PRACH occasion set, the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain, and the second PRACH occasion set and the reference time domain resource set overlap in the time domain, wherein the transmission of the first random access preambles belongs to one of a first type of random access process or a second type of random access process; when the transmission of the first random access preambles belongs to the first type of random access process, the candidate set of the first PRACH occasions is the first PRACH occasion set; when the transmission of the first random access preamble belongs to the second type of random access process, the candidate set of the first PRACH occasions is the second PRACH occasion set.

[0454] As one embodiment, the first node U01 is the first node in the present application.

[0455] As one embodiment, the second node N02 is the second node in the present application.

[0456] As one embodiment, an air interface between the second node N02 and the first node

U01 comprises a wireless interface between a base station device and user equipment.

[0457] As one embodiment, an air interface between the second node N02 and the first node U01 comprises a wireless interface between a relay node device and user equipment.

[0458] As one embodiment, an air interface between the second node N02 and the first node U01 comprises a wireless interface between user equipment and user equipment.

[0459] As one embodiment, the second node N02 is a serving cell maintaining base station of the first node U01.

[0460] As one embodiment, steps in a dotted block F51 do not exist.

[0461] As one embodiment, steps in a dotted block F51 exist.

[0462] As one embodiment, steps in a dotted block F51 exist. The above method used in a first node U01 for wireless communication comprises: receiving a second information block, wherein the second information block indicates a reference frequency domain resource set; the reference frequency domain resource set comprises at least one subcarrier or at least one RB used for uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters; and a PRACH occasion in the second PRACH occasion set that belongs, in the time domain, to the reference time domain resource set belongs, in the frequency domain, to the reference frequency domain resource set.

[0463] As one embodiment, steps in a dotted block F51 exist. The above method used in a second node N02 for wireless communication comprises: transmitting a second information block, wherein the second information block indicates a reference frequency domain resource set; the reference frequency domain resource set comprises at least one subcarrier or at least one RB used for uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters; and a PRACH occasion in the second PRACH occasion set that belongs, in the time domain, to the reference time domain resource set belongs, in the frequency domain, to the reference frequency domain resource set.

[0464] As one embodiment, the first information block is received not later than the second information block.

[0465] As one embodiment, the first information block is received earlier than the second information block.

[0466] As one embodiment, the second information block is received not later than the first information block.

[0467] As one embodiment, the second information block is received earlier than the first information block.

[0468] As one embodiment, the first information block and the second information block are received simultaneously.

[0469] As one embodiment, the first information block and the second information block are received together.

[0470] As one embodiment, the first information block and the second information block are borne by the same signaling.

[0471] As one embodiment, the first information block and the second information block are borne by the same higher layer signaling.

[0472] As one embodiment, the first information block and the second information block are borne by the same RRC signaling.

[0473] As one embodiment, the first information block and the second information block are borne by different signaling.

[0474] As one embodiment, the first information block and the second information block are borne by the same RRC IE.

[0475] As one embodiment, the first information block and the second information block are borne by two different RRC IEs, respectively.

[0476] As one embodiment, the first information block is transmitted on a PDSCH.

[0477] As one embodiment, the first information block is transmitted on a PDCCH.

[0478] As one embodiment, the second information block is transmitted on a PDSCH.

[0479] As one embodiment, the second information block is transmitted on a PDCCH.

[0480] As one embodiment, the first information block and the second information block are transmitted on the same PDSCH.

[0481] As one embodiment, the first information block and the second information block are transmitted on different PDSCHs.

[0482] **Embodiments 6A-6B**

[0483] Embodiments 6A-6B respectively illustrate schematic diagrams of a first type of random access process and a second type of random access process according to one embodiment of the present application, as shown in FIGs. 6A-6B.

[0484] In Embodiment 6A, one of the first type of random access process and the second type of random access process is contention based, and the other is contention free.

[0485] As one embodiment, the first type of random access process is contention based, and the second type of random access process is contention free.

[0486] In the above implementation, the first type of random access process is contention based, and avoids contention-based random access on symbols configured as DL by higher layer parameters, which reduces cross-link interference (CLI) between UE; and the second type of random access process is contention free, and allows contention-free random access on the symbols configured as the DL by the higher layer parameters, which reduces latency and enhances

coverage.

[0487] As one embodiment, the first type of random access process is contention free, and the second type of random access process is contention based.

[0488] In the above implementation, contention-based random access is allowed on symbols configured as DL by higher layer parameters, which reduces the probability of collision, increases the probability of access, and reduces latency.

[0489] As one embodiment, for the specific definitions of contention-based random access (CBRA) and contention-free random access (CFRA), see Chapter 9.2.6 of 3GPP TS 38.300.

[0490] In Embodiment 6B, one of the first type of random access process and the second type of random access process is a four-step random access process, and the other is a two-step random access process.

[0491] Typically, the four-step (4-step) random access process comprises: transmitting random access preambles, receiving a random access response (RAR), transmitting a PUSCH scheduled by an RAR uplink grant (UL grant), and receiving a PDSCH for contention resolution; and the two-step (2-step) random access process comprises: transmitting random access preambles and one PUSCH, and receiving a random access response (RAR).

[0492] As one embodiment, for the specific definitions of the four-step random access process and the two-step random access process, see Chapter 9.2.6 of 3GPP TS 38.300.

[0493] As one embodiment, the first type of random access process is the four-step random access process, and the second type of random access process is the two-step random access process.

[0494] In the above implementation, a two-step random access process is allowed on symbols configured as DL by higher layer parameters, which reduces latency.

[0495] As one embodiment, the first type of random access process is the two-step random access process, and the second type of random access process is the four-step random access process.

[0496] In the above implementation, a four-step random access process is allowed on symbols configured as DL by higher layer parameters, which reduces the probability of collision, increases the probability of access, and reduces latency.

[0497] As one embodiment, the four-step random access process is contention based.

[0498] As one embodiment, the four-step random access process is contention free.

[0499] As one embodiment, the two-step random access process is contention based.

[0500] As one embodiment, the two-step random access process is contention free.

[0501] As one embodiment, the first type of random access process comprises a contention-based four-step random access process and a contention-free two-step random access process, and

the second type of random access process comprises a contention-free four-step random access process and a contention-based two-step random access process.

[0502] As one embodiment, the first type of random access process comprises a contention-free four-step random access process and a contention-based two-step random access process, and the second type of random access process comprises a contention-based four-step random access process and a contention-free two-step random access process.

[0503] **Embodiment 7**

[0504] Embodiment 7 illustrates a schematic diagram of a priority of a first type of random access process and a priority of a second type of random access process according to one embodiment of the present application, as shown in FIG. 7.

[0505] In Embodiment 7, the priority of the first type of random access process is lower than the priority of the second type of random access process.

[0506] In the above implementation, high-priority random access is allowed on symbols configured as DL by higher layer parameters, which improves the probability of access, and reduces latency.

[0507] As one embodiment, a priority value of a random access process is configured by higher layer parameters, and the priority value is a non-negative integer or a positive integer; and the smaller the priority value, the higher a priority.

[0508] As one embodiment, the priority value is an integer not less than 0.

[0509] As one embodiment, the priority value is an integer not greater than 7.

[0510] As one embodiment, the priority value is a non-negative integer not greater than 7.

[0511] As one embodiment, a value range of the priority value is consecutive integers from 0 to 7.

[0512] As one embodiment, the priority value is one integer from 0 to 7.

[0513] As one embodiment, a priority value of one random access process is configured by one higher layer parameter, a name of which comprises "featurePriorities".

[0514] As one embodiment, a priority value of one random access process is configured by higher layer parameter featurePriorities-r17.

[0515] As one embodiment, a priority value of one random access process is configured by one higher layer parameter, a name of which comprises "FeaturePriority".

[0516] As one embodiment, a priority value of one random access process is configured by higher layer parameter FeaturePriority-r17.

[0517] As one embodiment, a priority value of one random access process is configured by one of one higher layer parameter, a name of which comprises "redCapPriority", one higher layer parameter, a name of which comprises "slicingPriority", one higher layer parameter, a name of

which comprises "msg3-Repetitions-Priority", or one higher layer parameter, a name of which comprises "sdt-Priority".

[0518] As one embodiment, a priority value of one random access process is configured by one of higher layer parameter redCapPriority-r17, higher layer parameter slicingPriority-r17, higher layer parameter msg3-Repetitions-Priority-r17, or higher layer parameter sdt-Priority-r17.

[0519] As one embodiment, for the specific definitions of featurePriorities-r17, FeaturePriority-r17, redCapPriority-r17, slicingPriority-r17, msg3-Repetitions-Priority-r17, and sdt-Priority-r17, see 3GPP TS 38.331.

[0520] As one embodiment, a priority value of the first type of random access process is equal to or greater than a first threshold, and a priority value of the second type of random access process is less than the first threshold; the smaller the priority value, the higher a priority; and the first threshold is a positive integer.

[0521] As one sub-embodiment of the above embodiment, the first threshold is one integer between 0 and 7.

[0522] As one sub-embodiment of the above embodiment, the first threshold is a positive integer not greater than 7.

[0523] As one sub-embodiment of the above embodiment, the first threshold is a positive integer less than 7.

[0524] As one sub-embodiment of the above embodiment, the first threshold is a positive integer greater than 0 and less than 7.

[0525] As one sub-embodiment of the above embodiment, the first threshold is configurable.

[0526] As one sub-embodiment of the above embodiment, the first threshold is fixed.

[0527] As one sub-embodiment of the above embodiment, the first threshold is preset.

[0528] As one embodiment, a priority value of the first type of random access process is greater than a first threshold, and a priority value of the second type of random access process is equal to or less than the first threshold; the smaller the priority value, the higher a priority; and the first threshold is a positive integer.

[0529] As one sub-embodiment of the above embodiment, the first threshold is one integer between 0 and 7.

[0530] As one sub-embodiment of the above embodiment, the first threshold is an integer not less than 0.

[0531] As one sub-embodiment of the above embodiment, the first threshold is an integer greater than 0.

[0532] As one sub-embodiment of the above embodiment, the first threshold is a positive integer greater than 0 and less than 7.

- [0533] As one sub-embodiment of the above embodiment, the first threshold is configurable.
- [0534] As one sub-embodiment of the above embodiment, the first threshold is fixed.
- [0535] As one sub-embodiment of the above embodiment, the first threshold is preset.
- [0536] As one embodiment, a priority of one random access process is a priority of a feature to the one random access process.
- [0537] As one embodiment, when one random access process is applicable to only one feature, a priority of the one random access process is a priority of the only one feature.
- [0538] As one embodiment, when one random access process is applicable to a plurality of features, a priority of the one random access process is the highest priority among the plurality of features.
- [0539] As one embodiment, the features comprise network slicing, Reduced Capability (RedCap), Small Data Transmission (SDT), and New Radio (NR) coverage enhancement.
- [0540] As one embodiment, the features comprise at least one of network slicing, Reduced Capability (RedCap), Small Data Transmission (SDT), or New Radio (NR) coverage enhancement.
- [0541] As one embodiment, the features comprise network slicing, Reduced Capability (RedCap), Small Data Transmission (SDT), and MSG3 repetition.
- [0542] As one embodiment, the features comprise at least one of network slicing, Reduced Capability (RedCap), Small Data Transmission (SDT), or MSG3 repetition.
- [0543] In the above implementation, for the specific definitions of network slicing, Reduced Capability (RedCap), and Small Data Transmission (SDT), see 3GPP TS 38.300 or 3GPP TS 38.321 or 3GPP TS 38.331.
- [0544] In the above implementation, for the specific definition of New Radio (NR) coverage enhancement, see 3GPP TS 38.300.
- [0545] In the above implementation, for the specific definition of MSG3 repetition, see 3GPP TS 38.321 or 3GPP TS 38.331.
- [0546] Typically, the lower a priority value of one feature, the higher a priority of the one feature.
- [0547] As one embodiment, a priority value of one feature is configured by one higher layer parameter, a name of which comprises "featurePriorities".
- [0548] As one embodiment, a priority value of one feature is configured by higher layer parameter featurePriorities-r17.
- [0549] As one embodiment, a priority value of one feature is configured by one higher layer parameter, a name of which comprises "FeaturePriority".
- [0550] As one embodiment, a priority value of one feature is configured by higher layer

parameter FeaturePriority-r17.

[0551] As one embodiment, a priority value of the feature of network slicing is configured by one higher layer parameter, a name of which comprises "slicingPriority".

[0552] As one embodiment, a priority value of the feature of network slicing is configured by higher layer parameter slicingPriority-r17.

[0553] As one embodiment, a priority value of the feature of RedCap is configured by one higher layer parameter, a name of which comprises "redCapPriority".

[0554] As one embodiment, a priority value of the feature of RedCap is configured by higher layer parameter redCapPriority-r17.

[0555] As one embodiment, a priority value of the feature of SDT is configured by one higher layer parameter, a name of which comprises "sdt-Priority".

[0556] As one embodiment, a priority value of the feature of SDT is configured by higher layer parameter sdt-Priority-r17.

[0557] As one embodiment, a priority value of the feature of New Radio (NR) coverage enhancement is configured by one higher layer parameter, a name of which comprises "msg3-Repetitions-Priority".

[0558] As one embodiment, a priority value of the feature of New Radio (NR) coverage enhancement is configured by higher layer parameter msg3-Repetitions-Priority-r17.

[0559] As one embodiment, a priority value of the feature of MSG3 repetition is configured by one higher layer parameter, a name of which comprises "msg3-Repetitions-Priority".

[0560] As one embodiment, a priority value of the feature of MSG3 repetition is configured by higher layer parameter msg3-Repetitions-Priority-r17.

[0561] As one embodiment, a priority value of any feature to the first type of random access process is equal to or greater than a first threshold, and a priority value of any feature to the second type of random access process is less than the first threshold; the smaller the priority value, the higher a priority; and the first threshold is a positive integer.

[0562] As one sub-embodiment of the above embodiment, the first threshold is one integer between 0 and 7.

[0563] As one sub-embodiment of the above embodiment, the first threshold is a positive integer not greater than 7.

[0564] As one sub-embodiment of the above embodiment, the first threshold is a positive integer less than 7.

[0565] As one sub-embodiment of the above embodiment, the first threshold is a positive integer greater than 0 and less than 7.

[0566] As one sub-embodiment of the above embodiment, the first threshold is configurable.

- [0567] As one sub-embodiment of the above embodiment, the first threshold is fixed.
- [0568] As one sub-embodiment of the above embodiment, the first threshold is preset.
- [0569] As one embodiment, a priority value of any feature to the first type of random access process is greater than a first threshold, and a priority value of any feature to the second type of random access process is equal to or less than the first threshold; the smaller the priority value, the higher a priority; and the first threshold is a positive integer.
- [0570] As one sub-embodiment of the above embodiment, the first threshold is one integer between 0 and 7.
- [0571] As one sub-embodiment of the above embodiment, the first threshold is an integer not less than 0.
- [0572] As one sub-embodiment of the above embodiment, the first threshold is an integer greater than 0.
- [0573] As one sub-embodiment of the above embodiment, the first threshold is a positive integer greater than 0 and less than 7.
- [0574] As one sub-embodiment of the above embodiment, the first threshold is configurable.
- [0575] As one sub-embodiment of the above embodiment, the first threshold is fixed.
- [0576] As one sub-embodiment of the above embodiment, the first threshold is preset.
- [0577] As one embodiment, the meaning of "a priority of the first type of random access process is lower than a priority of the second type of random access process" comprises: a priority value of the first type of random access process is not less than a priority value of the second type of random access process.
- [0578] As one embodiment, the meaning of "a priority of the first type of random access process is lower than a priority of the second type of random access process" comprises: a priority value of the first type of random access process is greater than a priority value of the second type of random access process.
- [0579] As one embodiment, the meaning of "a priority of the first type of random access process is lower than a priority of the second type of random access process" comprises: a priority value of one random access process that belongs to the first type of random access process is greater than a priority value of one random access process that belongs to the second type of random access process.
- [0580] As one embodiment, the meaning of "a priority of the first type of random access process is lower than a priority of the second type of random access process" comprises: a priority value of any random access process that belongs to the first type of random access process is greater than a priority value of any random access process that belongs to the second type of random access process.

[0581] As one embodiment, the meaning of "a priority of the first type of random access process is lower than a priority of the second type of random access process" comprises: a priority value of one feature to the first type of random access process is greater than a priority value of one feature to the second type of random access process.

[0582] As one embodiment, the meaning of "a priority of the first type of random access process is lower than a priority of the second type of random access process" comprises: a priority value of any feature to the first type of random access process is not less than a priority value of any feature to the second type of random access process.

[0583] As one embodiment, the meaning of "a priority of the first type of random access process is lower than a priority of the second type of random access process" comprises: a priority value of any feature to the first type of random access process is greater than a priority value of any feature to the second type of random access process.

[0584] As one embodiment, the meaning of "a priority of the first type of random access process is lower than a priority of the second type of random access process" comprises: a priority value of a feature to any random access process that belongs to the first type of random access process is greater than a priority value of a feature to any random access process that belongs to the second type of random access process.

[0585] **Embodiment 8**

[0586] Embodiment 8 illustrates a schematic diagram of a first event set and a second event set according to one embodiment of the present application, as shown in FIG. 8.

[0587] In Embodiment 8, the first type of random access process is initiated for a first event set, and the second type of random access process is initiated for a second event set; and the first event set comprises one or more events, the second event set comprises one or more events, and any event in the first event set does not belong to the second event set.

[0588] As one embodiment, the first event set and the second event set each comprise at least one event in a reference event set, and the reference event set comprises a plurality of events.

[0589] As one embodiment, the second event set comprises some events in a reference event set, the first event set comprises at least one event in the reference event set other than the second event set, and the reference event set comprises a plurality of events.

[0590] As one embodiment, the second event set comprises some events in a reference event set, the first event set comprises all events in the reference event set other than the second event set, and the reference event set comprises a plurality of events.

[0591] As one embodiment, the reference event set at least comprises a plurality of events among a PDCCH order, a System Information (SI) request, Beam failure recovery, synchronous reconfiguration (reconfiguration with sync), or scheduling request (SR).

- [0592] As one embodiment, the reference event set at least comprises a plurality of events among a PDCCH order, a System Information (SI) request, Beam failure recovery, synchronous reconfiguration (reconfiguration with sync), a scheduling request (SR), or Initial access.
- [0593] As one embodiment, the reference event set at least comprises a plurality of events among a PDCCH order, a System Information (SI) request, Beam failure recovery, synchronous reconfiguration (reconfiguration with sync), a scheduling request (SR), Initial access, or handover.
- [0594] As one embodiment, the reference event set at least comprises a plurality of events among a PDCCH order, a System Information (SI) request, Beam failure recovery, synchronous reconfiguration (reconfiguration with sync), a scheduling request (SR), Initial access, or Dual Active Protocol Stack (DAPS) handover.
- [0595] As one embodiment, the first event set comprises Initial access.
- [0596] As one embodiment, the first event set comprises a scheduling request.
- [0597] As one embodiment, the first event set comprises an SI request.
- [0598] As one embodiment, the first event set comprises at least one of a scheduling request, an SI request, or Initial access.
- [0599] As one embodiment, the first event set comprises a scheduling request and an SI request.
- [0600] As one embodiment, the first event set comprises a scheduling request and Initial access.
- [0601] As one embodiment, the first event set comprises an SI request and Initial access.
- [0602] As one embodiment, the first event set comprises a scheduling request, an SI request, and Initial access.
- [0603] As one embodiment, the first event set at least comprises a scheduling request, an SI request, and Initial access.
- [0604] As one embodiment, the second event set comprises a PDCCH order.
- [0605] In the above implementation, for a PDCCH order, random access is allowed on symbols configured as DL by higher layer parameters, which achieves flexibility of system scheduling.
- [0606] As one embodiment, the second event set comprises Beam failure recovery.
- [0607] In the above implementation, for beam failure recovery, random access is allowed on symbols configured as DL by higher layer parameters, which achieves beam recovery faster.
- [0608] As one embodiment, the second event set comprises reconfiguration with sync.
- [0609] In the above implementation, for reconfiguration with sync, random access is allowed on symbols configured as DL by higher layer parameters, which achieves synchronous reconfiguration and cell handover faster.
- [0610] As one embodiment, the second event set comprises handover.
- [0611] In the above implementation, for handover, random access is allowed on symbols configured as DL by higher layer parameters, so that handover is completed faster, and latency is

reduced.

[0612] As one embodiment, the second event set comprises at least one of a PDCCH order, Beam failure recovery, or reconfiguration with sync.

[0613] As one embodiment, the second event set comprises a PDCCH order, Beam failure recovery, and reconfiguration with sync.

[0614] As one embodiment, the second event set at least comprises a PDCCH order, Beam failure recovery, and reconfiguration with sync.

[0615] As one embodiment, the second event set comprises at least one of a PDCCH order, Beam failure recovery, reconfiguration with sync, or handover.

[0616] As one embodiment, the second event set comprises a PDCCH order, Beam failure recovery, reconfiguration with sync, and handover.

[0617] As one embodiment, the second event set at least comprises a PDCCH order, Beam failure recovery, reconfiguration with sync, and handover.

[0618] As one embodiment, the second event set comprises: a PDCCH order, Beam failure recovery, and reconfiguration with sync; and the first event set comprises: a scheduling request, an SI request, and Initial access.

[0619] As one embodiment, the second event set comprises: a PDCCH order, Beam failure recovery, and reconfiguration with sync; and the first event set comprises: a scheduling request, and an SI request.

[0620] As one embodiment, the second event set comprises: a PDCCH order, Beam failure recovery, and reconfiguration with sync; and the first event set comprises: a scheduling request, and Initial access.

[0621] As one embodiment, the second event set comprises: a PDCCH order, Beam failure recovery, and reconfiguration with sync; and the first event set comprises: an SI request, and Initial access.

[0622] As one embodiment, the second event set comprises: a PDCCH order, and Beam failure recovery; and the first event set comprises: a scheduling request, an SI request, and Initial access.

[0623] As one embodiment, the second event set comprises: a PDCCH order, and reconfiguration with sync; and the first event set comprises: a scheduling request, an SI request, and Initial access.

[0624] As one embodiment, the second event set comprises: Beam failure recovery, and reconfiguration with sync; and the first event set comprises: a scheduling request, an SI request, and Initial access.

[0625] As one embodiment, the second event set comprises: a PDCCH order, Beam failure recovery, reconfiguration with sync, and handover; and the first event set comprises: a scheduling

request, an SI request, and Initial access.

[0626] As one embodiment, the second event set comprises: a PDCCH order, Beam failure recovery, reconfiguration with sync, and handover; and the first event set comprises: a scheduling request, and an SI request.

[0627] As one embodiment, the second event set comprises: a PDCCH order, Beam failure recovery, reconfiguration with sync, and handover; and the first event set comprises: a scheduling request, and Initial access.

[0628] As one embodiment, the second event set comprises: a PDCCH order, Beam failure recovery, reconfiguration with sync, and handover; and the first event set comprises: an SI request, and Initial access.

[0629] As one embodiment, the second event set comprises: a PDCCH order, Beam failure recovery, and reconfiguration with sync; and the first event set comprises: a scheduling request, an SI request, Initial access, and handover.

[0630] As one embodiment, the reference event set at least comprises a plurality of events from the following events:

- Initial access from RRC_IDLE;
- an RRC connection re-establishment process;
- arrival of downlink or uplink data when an uplink synchronization status is "out of sync" and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress;
- arrival of uplink data when there are no Physical Uplink Control Channel (PUCCH) resources to an SR is applicable and the SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress;
- scheduling request (SR) failure;
- an RRC request during synchronous reconfiguration;
- an RRC connection recovery process from RRC_INACTIVE;
- time alignment establishment for a secondary Timing Advance Group;
- a request for other SI;
- Beam failure recovery;
- consistent uplink Listen Before Talk (LBT) failure on a Special Cell (SpCell);
- SDT under RRC_INACTIVE; and
- positioning purposes during RRC_CONNECTED that require a random access process.

[0631] As one embodiment, the first event set comprises: initial access from RRC_IDLE.

[0632] As one embodiment, the first event set comprises: an RRC connection re-establishment process.

[0633] As one embodiment, the first event set comprises: arrival of downlink or uplink data

when an uplink synchronization status is "out of sync" and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress.

[0634] As one embodiment, the first event set comprises: arrival of uplink data when there are no PUCCH resources to which an SR is applicable and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress.

[0635] As one embodiment, the first event set comprises: scheduling request failure.

[0636] As one embodiment, the first event set comprises: time alignment establishment for a secondary Timing Advance Group.

[0637] As one embodiment, the first event set comprises: a request for other SI.

[0638] As one embodiment, the first event set comprises: consistent uplink LBT failure on a SpCell.

[0639] As one embodiment, the first event set comprises: SDT under RRC_INACTIVE.

[0640] As one embodiment, the first event set comprises: positioning purposes during RRC_CONNECTED that require a random access process.

[0641] As one embodiment, the first event set comprises at least one of the following: (1) initial access from RRC_IDLE, (2) an RRC connection re-establishment process, (3) arrival of downlink or uplink data when an uplink synchronization status is "out of sync" and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (4) arrival of uplink data when there are no PUCCH resources to which an SR is applicable and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (5) scheduling request failure, (6) time alignment establishment for a secondary Timing Advance Group, (7) a request for other SI, (8) consistent uplink LBT failure on a SpCell, (9) SDT under RRC_INACTIVE, and (10) positioning purposes during RRC_CONNECTED that require a random access process.

[0642] As one embodiment, the first event set comprises: (1) initial access from RRC_IDLE, (2) an RRC connection re-establishment process, (3) arrival of downlink or uplink data when an uplink synchronization status is "out of sync" and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (4) arrival of uplink data when there are no PUCCH resources to which an SR is applicable and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (5) scheduling request failure, (6) time alignment establishment for a secondary Timing Advance Group, (7) a request for other SI, (8) consistent uplink LBT failure on a SpCell, (9) SDT under RRC_INACTIVE, and (10) positioning purposes during RRC_CONNECTED that require a random access process.

[0643] As one embodiment, the first event set at least comprises: (1) initial access from RRC_IDLE, (2) an RRC connection re-establishment process, (3) arrival of downlink or uplink data when an uplink synchronization status is "out of sync" and an SDT process under

RRC_CONNECTED or RRC_INACTIVE is in progress, (4) arrival of uplink data when there are no PUCCH resources to which an SR is applicable and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (5) scheduling request failure, (6) time alignment establishment for a secondary Timing Advance Group, (7) a request for other SI, (8) consistent uplink LBT failure on a SpCell, (9) SDT under RRC_INACTIVE, and (10) positioning purposes during RRC_CONNECTED that require a random access process.

[0644] As one embodiment, the second event set comprises: arrival of downlink or uplink data when an uplink synchronization status is "out of sync" and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress.

[0645] In the above implementation, for the arrival of downlink or uplink data, random access is allowed on symbols configured as DL by higher layer parameters, which reduces latency in transmitting the downlink or uplink data.

[0646] As one embodiment, the second event set comprises: arrival of uplink data when there are no PUCCH resources to which an SR is applicable and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress.

[0647] In the above implementation, for the arrival of uplink data, random access is allowed on symbols configured as DL by higher layer parameters, which reduces latency in transmitting the uplink data and enhancing uplink performance.

[0648] As one embodiment, the second event set comprises: an RRC request during synchronous reconfiguration.

[0649] In the above implementation, for the RRC request during synchronization reconfiguration, random access is allowed on symbols configured as DL by higher layer parameters, so as to complete RRC synchronization reconfiguration faster.

[0650] As one embodiment, the second event set comprises: an RRC connection recovery process from RRC_INACTIVE.

[0651] In the above implementation, for the RRC connection recovery process from RRC_INACTIVE, random access is allowed on symbols configured as DL by higher layer parameters, so that an RRC connection can be recovered faster.

[0652] As one embodiment, the second event set comprises: time alignment establishment for a secondary Timing Advance Group.

[0653] In the above implementation, for the time alignment establishment for the secondary Timing Advance Group, random access is allowed on symbols configured as DL by higher layer parameters, which establishes time alignment faster and reduces latency.

[0654] As one embodiment, the second event set comprises: beam failure recovery.

[0655] In the above implementation, for beam failure recovery, random access is allowed on

symbols configured as DL by higher layer parameters, which realizes beam recovery faster and improves reliability of communication.

[0656] As one embodiment, the second event set comprises: consistent uplink LBT failure on a SpCell.

[0657] In the above implementation, for the consistent uplink LBT failure on the SpCell, random access is allowed on symbols configured as DL by higher layer parameters, which recovers uplink LBT in a more timely manner.

[0658] As one embodiment, the second event set comprises: SDT under RRC_INACTIVE.

[0659] In the above implementation, for SDT under the RRC_INACTIVE, random access is allowed on symbols configured as DL by higher layer parameters, which improves performance of SDT.

[0660] As one embodiment, the second event set comprises: positioning purposes during RRC_CONNECTED that require a random access process.

[0661] In the above implementation, for the positioning purposes, random access is allowed on symbols configured as DL by higher layer parameters, which acquires positioning information in a more timely manner, and improves communication quality.

[0662] As one embodiment, the second event set comprises at least one of the following: (1) arrival of downlink or uplink data when an uplink synchronization status is "out of sync" and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (2) arrival of uplink data when there are no PUCCH resources to which an SR is applicable and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (3) an RRC request during synchronous reconfiguration, (4) an RRC connection recovery process from RRC_INACTIVE, (5) time alignment establishment for a secondary Timing Advance Group, (6) beam failure recovery, (7) consistent uplink LBT failure on a SpCell, (8) SDT under RRC_INACTIVE, and (9) positioning purposes during RRC_CONNECTED that require a random access process.

[0663] As one embodiment, the second event set comprises: (1) arrival of downlink or uplink data when an uplink synchronization status is "out of sync" and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (2) arrival of uplink data when there are no PUCCH resources to which an SR is applicable and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (3) an RRC request during synchronous reconfiguration, (4) an RRC connection recovery process from RRC_INACTIVE, (5) time alignment establishment for a secondary Timing Advance Group, (6) beam failure recovery, (7) consistent uplink LBT failure on a SpCell, (8) SDT under RRC_INACTIVE, and (9) positioning purposes during RRC_CONNECTED that require a random access process.

[0664] As one embodiment, the second event set at least comprises: (1) arrival of downlink or

uplink data when an uplink synchronization status is "out of sync" and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (2) arrival of uplink data when there are no PUCCH resources to which an SR is applicable and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (3) an RRC request during synchronous reconfiguration, (4) an RRC connection recovery process from RRC_INACTIVE, (5) time alignment establishment for a secondary Timing Advance Group, (6) beam failure recovery, (7) consistent uplink LBT failure on a SpCell, (8) SDT under RRC_INACTIVE, and (9) positioning purposes during RRC_CONNECTED that require a random access process.

[0665] As one embodiment, the second event set comprises: (1) arrival of downlink or uplink data when an uplink synchronization status is "out of sync" and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (2) arrival of uplink data when there are no PUCCH resources to which an SR is applicable and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (3) an RRC request during synchronous reconfiguration, (4) an RRC connection recovery process from RRC_INACTIVE, (5) time alignment establishment for a secondary Timing Advance Group, (6) beam failure recovery, (7) consistent uplink LBT failure on a SpCell, (8) SDT under RRC_INACTIVE, and (9) positioning purposes during RRC_CONNECTED that require a random access process; and the first event set comprises: (1) initial access from RRC_IDLE, (2) an RRC connection re-establishment process, (3) scheduling request failure, (4) a request for other SI.

[0666] As one embodiment, the second event set comprises: (1) an RRC request during synchronous reconfiguration, (2) an RRC connection recovery process from RRC_INACTIVE, (3) time alignment establishment for a secondary Timing Advance Group, (4) beam failure recovery, (5) consistent uplink LBT failure on a SpCell, (6) SDT under RRC_INACTIVE, (7) positioning purposes during RRC_CONNECTED that require a random access process; and the first event set comprises: (1) initial access from RRC_IDLE, (2) an RRC connection re-establishment process, (3) arrival of downlink or uplink data when an uplink synchronization status is "out of sync" and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (4) arrival of uplink data when there are no PUCCH resources to which an SR is applicable and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (5) scheduling request failure, and (6) a request for other SI.

[0667] As one embodiment, the second event set comprises: (1) an RRC request during synchronous reconfiguration, (2) an RRC connection recovery process from RRC_INACTIVE, (3) beam failure recovery, (4) consistent uplink LBT failure on a SpCell, (5) SDT under RRC_INACTIVE, and (6) positioning purposes during RRC_CONNECTED that require a random access process; and the first event set comprises: (1) initial access from RRC_IDLE, (2)

an RRC connection re-establishment process, (3) arrival of downlink or uplink data when an uplink synchronization status is "out of sync" and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (4) arrival of uplink data when there are no PUCCH resources to which an SR is applicable and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (5) scheduling request failure, (6) a request for other SI, and (7) time alignment establishment for the secondary Timing Advance Group.

[0668] As one embodiment, the second event set comprises: (1) an RRC request during synchronous reconfiguration, (2) an RRC connection recovery process from RRC_INACTIVE, (3) beam failure recovery, (4) SDT under RRC_INACTIVE, and (5) positioning purposes during RRC_CONNECTED that require a random access process; and the first event set comprises: (1) initial access from RRC_IDLE, (2) an RRC connection re-establishment process, (3) arrival of downlink or uplink data when an uplink synchronization status is "out of sync" and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (4) arrival of uplink data when there are no PUCCH resources to which an SR is applicable and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (5) scheduling request failure, (6) a request for other SI, (7) time alignment establishment for a secondary Timing Advance Group, and (8) consistent uplink LBT failure on a SpCell.

[0669] As one embodiment, the second event set comprises: (1) an RRC request during synchronous reconfiguration, (2) an RRC connection recovery process from RRC_INACTIVE, (3) beam failure recovery, and (4) positioning purposes during RRC_CONNECTED that require a random access process; and the first event set comprises: (1) initial access from RRC_IDLE, (2) an RRC connection re-establishment process, (3) arrival of downlink or uplink data when an uplink synchronization status is "out of sync" and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (4) arrival of uplink data when there are no PUCCH resources to which an SR is applicable and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (5) scheduling request failure, (6) a request for other SI, (7) time alignment establishment for a secondary Timing Advance Group, (8) consistent uplink LBT failure on a SpCell, and (9) SDT under RRC_INACTIVE.

[0670] As one embodiment, the second event set comprises: (1) an RRC request during synchronous reconfiguration, (2) an RRC connection recovery process from RRC_INACTIVE, and (3) beam failure recovery; and the first event set comprises: (1) initial access from RRC_IDLE, (2) an RRC connection re-establishment process, (3) arrival of downlink or uplink data when an uplink synchronization status is "out of sync" and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (4) arrival of uplink data when there are no PUCCH resources to which an SR is applicable and an SDT process under RRC_CONNECTED or RRC_INACTIVE

is in progress, (5) scheduling request failure, (6) a request for other SI, (7) time alignment establishment for a secondary Timing Advance Group, (8) consistent uplink LBT failure on a SpCell, (9) SDT under RRC_INACTIVE, and (10) positioning purposes during RRC_CONNECTED that require a random access process.

[0671] As one embodiment, the second event set comprises: (1) an RRC request during synchronous reconfiguration, and (2) beam failure recovery; and the first event set comprises: (1) initial access from RRC_IDLE, (2) an RRC connection re-establishment process, (3) arrival of downlink or uplink data when an uplink synchronization status is "out of sync" and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (4) arrival of uplink data when there are no PUCCH resources to which an SR is applicable and an SDT process under RRC_CONNECTED or RRC_INACTIVE is in progress, (5) scheduling request failure, (6) a request for other SI, (7) time alignment establishment for a secondary Timing Advance Group, (8) consistent uplink LBT failure on a SpCell, (9) SDT under RRC_INACTIVE, (10) positioning purposes during RRC_CONNECTED that require a random access process, and (11) an RRC connection recovery process from RRC_INACTIVE.

[0672] **Embodiment 9**

[0673] Embodiment 9 illustrates a schematic diagram of a feature to a first type of random access process and a feature to a second type of random access process according to one embodiment of the present application, as shown in FIG. 9.

[0674] In Embodiment 9, any feature to the first type of random access process is not a feature to the second type of random access process.

[0675] As one embodiment, a reference feature set comprises a plurality of features, the first type of random access process is applicable to one part of the features in the reference feature set, the second type of random access process is applicable to one part of the features in the reference feature set, and any feature to the first type of random access process is not a feature to the second type of random access process.

[0676] As one embodiment, a reference feature set comprises a plurality of features, the first type of random access process is applicable to a part of the features in the reference feature set, and a feature to the second type of random access process is a feature in the reference feature set, other than the part of the features, to the first type of random access process.

[0677] As one embodiment, a reference feature set comprises a plurality of features, the first type of random access process is applicable to a part of the features in the reference feature set, and features to the second type of random access process are all features in the reference feature set, other than the part of the features, to the first type of random access process.

[0678] As one embodiment, the reference feature set comprises Network Slicing, Reduced

Capability (RedCap), Small Data Transmission (SDT), and New Radio (NR) coverage enhancement.

[0679] As one embodiment, the reference feature set comprises a plurality of features among Network Slicing, Reduced Capability (RedCap), Small Data Transmission (SDT), or New Radio (NR) coverage enhancement.

[0680] As one embodiment, the reference feature set comprises Network Slicing, Reduced Capability (RedCap), Small Data Transmission (SDT), and MSG3 repetition.

[0681] As one embodiment, the reference feature set comprises a plurality of features among Network Slicing, Reduced Capability (RedCap), Small Data Transmission (SDT), or MSG3 repetition.

[0682] As one embodiment, features to the first type of random access process comprise network slicing.

[0683] As one embodiment, features to the first type of random access process comprise RedCap.

[0684] In the above implementation, for the feature of RedCap, random access is not allowed on symbols configured as DL by higher layer parameters, which reduces a UE capability.

[0685] As one embodiment, features to the first type of random access process comprise SDT.

[0686] As one embodiment, features to the first type of random access process comprise at least one of network slicing, RedCap, and SDT.

[0687] As one embodiment, features to the first type of random access process comprise network slicing, RedCap, and SDT.

[0688] As one embodiment, features to the first type of random access process comprise at least RedCap.

[0689] As one embodiment, features to the second type of random access process comprise network slicing.

[0690] As one embodiment, features to the second type of random access process comprise SDT.

[0691] In the above implementation, for the feature of SDT, random access is allowed on symbols configured as DL by higher layer parameters, which reduces latency of SDT and improves performance of SDT.

[0692] As one embodiment, features to the second type of random access process comprise NR coverage enhancement.

[0693] In the above implementation, for the feature of NR coverage enhancement, random access is allowed on symbols configured as DL by higher layer parameters, which enhances coverage.

[0694] As one embodiment, features to the second type of random access process comprise MSG3 repetition.

[0695] In the above implementation, for the feature of MSG3 repetition, random access is allowed on symbols configured as DL by higher layer parameters, which improves MSG3 transmission reliability and enhances coverage.

[0696] As one embodiment, features to the second type of random access process comprise at least one of network slicing, SDT, and NR coverage enhancement.

[0697] As one embodiment, features to the second type of random access process comprise network slicing, SDT, and NR coverage enhancement.

[0698] As one embodiment, features to the second type of random access process comprise at least NR coverage enhancement.

[0699] As one embodiment, features to the second type of random access process comprise at least one of network slicing, SDT, and MSG3 repetition.

[0700] As one embodiment, features to the second type of random access process comprise network slicing, SDT, and MSG3 repetition.

[0701] As one embodiment, features to the second type of random access process comprise at least MSG3 repetition.

[0702] As one embodiment, features to the second type of random access process comprise: network slicing, SDT, and NR coverage enhancement; and features to which the first type of random access process is applicable comprise: RedCap.

[0703] As one embodiment, features to the second type of random access process comprise: SDT, and NR coverage enhancement; and features to the first type of random access process comprise: network slicing, and RedCap.

[0704] As one embodiment, features to the second type of random access process comprise: NR coverage enhancement; and features to the first type of random access process comprise: network slicing, RedCap, and SDT.

[0705] As one embodiment, features to the second type of random access process comprise: network slicing, SDT, and MSG3 repetition; and features to the first type of random access process comprise: RedCap.

[0706] As one embodiment, features to the second type of random access process comprise: SDT, and MSG3 repetition; and features to the first type of random access process comprise: network slicing, and RedCap.

[0707] As one embodiment, features to the second type of random access process comprise: MSG3 repetition; and features to the first type of random access process comprise: network slicing, RedCap, and SDT.

[0708] As one embodiment, a feature to one random access process is associated with at least one PRACH resource in the one random access process.

[0709] As one embodiment, a feature to one random access process is associated with at least one valid PRACH resource in the one random access process.

[0710] As one embodiment, a feature to one random access process is associated with a valid PRACH resource in the one random access process.

[0711] As one embodiment, a feature to one random access process is a feature associated with a valid PRACH resource in the one random access process.

[0712] As one embodiment, one random access process is applicable to one feature, and a valid PRACH resource in the one random access process is associated with the one feature.

[0713] As one embodiment, one random access process is applicable to only one feature, and a valid PRACH resource in the one random access process is associated with the only one feature.

[0714] As one embodiment, one random access process is applicable to a plurality of features, and a valid PRACH resource in the one random access process is associated with the plurality of features.

[0715] As one embodiment, one random access process is applicable to a plurality of features, and a valid PRACH resource in the one random access process is associated with at least one feature among the plurality of features.

[0716] As one embodiment, one random access process is applicable to a plurality of features, and a valid PRACH resource in the one random access process is associated with one feature among the plurality of features.

[0717] As one embodiment, one random access process is applicable to a plurality of features, and a valid PRACH resource in the one random access process is associated with all features among the plurality of features.

[0718] As one embodiment, the meaning that one feature is associated with at least one PRACH resource comprises: the one feature is applicable to one random access process, and the at least one PRACH resource is a PRACH resource of the one random access process.

[0719] As one embodiment, the meaning that one feature is associated with at least one PRACH resource comprises: the one feature is applicable to one random access process, and the at least one PRACH resource is a PRACH resource configured for the one random access process.

[0720] As one embodiment, the meaning that one feature is associated with at least one PRACH resource comprises: the one feature is applicable to one random access process, and the at least one PRACH resource is a valid PRACH resource of the one random access process.

[0721] As one embodiment, the meaning that one feature is associated with at least one PRACH resource comprises: the one feature is applicable to one random access process, and the at least

one PRACH resource is a valid PRACH resource configured for the one random access process.

[0722] As one embodiment, the meaning that one feature is associated with at least one PRACH resource comprises: the one feature is applicable to one random access process, the at least one PRACH resource is a valid PRACH resource of the one random access process, and the at least one PRACH resource is configured for the one feature.

[0723] As one embodiment, the meaning that one feature is associated with at least one PRACH resource comprises: the one feature is applicable to one random access process, the at least one PRACH resource is a valid PRACH resource of the one random access process, and any PRACH resource in the at least one PRACH resource is configured for the one feature.

[0724] As one embodiment, any valid PRACH resource in one random access process is configured for one feature to the one random access process.

[0725] As one embodiment, one feature is configured with at least one PRACH resource, and a feature with which the at least one PRACH resource is associated is the one feature.

[0726] As one embodiment, at least one PRACH resource is associated with one feature, and only when the one feature is a feature to one random access process, the at least one PRACH resource is a valid PRACH resource of the one random access process.

[0727] As one embodiment, at least one PRACH resource is associated with one feature, and only when the one feature is one feature to one random access process, the at least one PRACH resource is a valid PRACH resource of the one random access process.

[0728] As one embodiment, at least one PRACH resource is associated with one feature, and only when the one feature is one feature among a plurality of features to one random access process, the at least one PRACH resource is a valid PRACH resource of the one random access process.

[0729] As one embodiment, at least one PRACH resource is associated with a plurality of features, and only when the plurality of features are features to one random access process, the at least one PRACH resource is a valid PRACH resource of the one random access process.

[0730] As one embodiment, at least one PRACH resource is associated with a plurality of features, and only when each feature among the plurality of features is a feature to one random access process, the at least one PRACH resource is a valid PRACH resource of the one random access process.

[0731] As one embodiment, at least one PRACH resource is associated with a plurality of features, and only when all features among the plurality of features are features to one random access process, the at least one PRACH resource is a valid PRACH resource of the one random access process.

[0732] As one embodiment, the PRACH resource comprises at least one of a PRACH occasion

and a random access preamble.

[0733] As one embodiment, the PRACH resource comprises a PRACH occasion and a random access preamble.

[0734] **Embodiment 10**

[0735] Embodiment 10 illustrates a schematic diagram in which a subcarrier or resource block is used for uplink transmission according to one embodiment of the present application, as shown in FIG. 10.

[0736] In Embodiment 10, in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters, at least one subcarrier or at least one resource block is used for uplink transmission.

[0737] As one embodiment, at least one symbol in the reference time domain resource set is configured as DL by the higher layer parameters.

[0738] As one embodiment, any symbol in the reference time domain resource set is configured as DL by the higher layer parameters.

[0739] As one embodiment, any symbol in the reference time domain resource set is configured as DL or Flexible by the higher layer parameters.

[0740] As one embodiment, each symbol in the reference time domain resource set is configured as DL by the higher layer parameters.

[0741] As one embodiment, each symbol in the reference time domain resource set is configured as DL or Flexible by the higher layer parameters.

[0742] As one embodiment, at least one symbol in the reference time domain resource set is configured as DL by the higher layer parameters, and at least one symbol in the reference time domain resource set is configured as Flexible by the higher layer parameters.

[0743] As one embodiment, the reference time domain resource set is configured for one serving cell.

[0744] As one embodiment, the reference time domain resource set is configured for at least one BWP.

[0745] As one embodiment, the reference time domain resource set is configured for one BWP.

[0746] As one embodiment, the reference time domain resource set is configured for one DL BWP.

[0747] As one embodiment, the reference time domain resource set is configured for a pair of BWPs (a DL BWP and a UL BWP).

[0748] As one embodiment, the reference time domain resource set is configured for one serving cell; and on the one serving cell, in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters, at least one subcarrier or at

least one RB is used for uplink transmission.

[0749] As one embodiment, the reference time domain resource set is configured for at least one BWP; and on the at least one BWP, in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters, at least one subcarrier or at least one RB is used for uplink transmission.

[0750] As one embodiment, the reference time domain resource set is configured for one BWP; and on the one BWP, in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters, at least one subcarrier or at least one RB is used for uplink transmission.

[0751] As one embodiment, the reference time domain resource set is configured for a pair of BWPs (a DL BWP and a UL BWP), and on the UL BWP of the pair of BWPs (the DL BWP and the UL BWP), in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters, at least one subcarrier or at least one RB is used for uplink transmission.

[0752] As one embodiment, the reference time domain resource set is configured for one DL BWP; a first UL BWP is the UL BWP in a pair of BWPs (a DL BWP and a UL BWP) to which the one DL BWP belongs; and on the first UL BWP, in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters, at least one subcarrier or at least one RB is used for uplink transmission.

[0753] As one embodiment, the uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters comprises at least one of a Physical Uplink Shared Channel (PUSCH), a Physical Uplink Control Channel (PUCCH), a Physical Random-Access Channel (PRACH) or a Sounding Reference Signal (SRS).

[0754] As one embodiment, the uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters comprises a PUSCH.

[0755] As one embodiment, the uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters comprises a PUCCH.

[0756] As one embodiment, the uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters comprises a PRACH.

[0757] As one embodiment, the uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters comprises a SRS.

[0758] **Embodiment 11**

[0759] Embodiment 11 illustrates a schematic diagram of a second information block and a reference frequency domain resource set according to one embodiment of the present application, as shown in FIG. 11.

[0760] In Embodiment 11, the first receiver receives a second information block, wherein the second information block indicates a reference frequency domain resource set; the reference frequency domain resource set comprises at least one subcarrier or at least one RB used for uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters; and a PRACH occasion in the second PRACH occasion set that belongs, in the time domain, to the reference time domain resource set belongs, in the frequency domain, to the reference frequency domain resource set.

[0761] As one embodiment, the second information block is borne by higher layer signaling.

[0762] As one embodiment, the second information block is borne by RRC signaling.

[0763] As one embodiment, the second information block comprises all or some of fields in one RRC IE.

[0764] As one embodiment, the second information block comprises some of fields in one RRC IE.

[0765] As one embodiment, the second information block comprises all or some of fields in each RRC IE among a plurality of RRC IEs.

[0766] As one embodiment, the second information block comprises all or some of fields in a ServingCellConfig IE.

[0767] As one embodiment, the second information block comprises all or some of fields in a ServingCellConfigCommonSIB IE.

[0768] As one embodiment, the second information block comprises all or some of fields in a ServingCellConfigCommon IE.

[0769] As one embodiment, the second information block comprises all or some of fields in a DownlinkConfigCommon IE.

[0770] As one embodiment, the second information block comprises all or some of fields in a DownlinkConfigCommonSIB IE.

[0771] As one embodiment, the second information block comprises all or some of fields in an UplinkConfigCommon IE.

[0772] As one embodiment, the second information block comprises all or some of fields in an UplinkConfigCommonSIB IE.

[0773] As one embodiment, the second information block comprises all or some of fields in an RRC IE, a name of which comprises "BWP-Uplink".

[0774] As one embodiment, the second information block comprises all or some of fields in a BWP-UplinkCommon IE.

[0775] As one embodiment, the second information block comprises all or some of fields in a BWP-UplinkDedicated IE.

[0776] As one embodiment, the second information block comprises all or some of fields in an RRC IE, a name of which comprises "BWP-Downlink".

[0777] As one embodiment, the second information block comprises all or some of fields in a BWP-DownlinkCommon IE.

[0778] As one embodiment, the second information block comprises all or some of fields in a BWP-DownlinkDedicated IE.

[0779] As one embodiment, the second information block is carried by at least one RRC IE.

[0780] As one embodiment, the second information block is carried by a ServingCellConfig IE.

[0781] As one embodiment, the second information block is carried by a ServingCellConfigCommonSIB IE.

[0782] As one embodiment, the second information block is carried by a ServingCellConfigCommon IE.

[0783] As one embodiment, the second information block is carried by a DownlinkConfigCommon IE.

[0784] As one embodiment, the second information block is carried by a DownlinkConfigCommonSIB IE.

[0785] As one embodiment, the second information block is carried by an UplinkConfigCommon IE.

[0786] As one embodiment, the second information block is carried by an UplinkConfigCommonSIB IE.

[0787] As one embodiment, the second information block is carried by a BWP-UplinkCommon IE.

[0788] As one embodiment, the second information block is carried by a BWP-UplinkDedicated IE.

[0789] As one embodiment, the second information block is carried by a BWP-DownlinkCommon IE.

[0790] As one embodiment, the second information block is carried by a BWP-DownlinkDedicated IE.

[0791] As one embodiment, a name of one IE carrying the second information block comprises "ServingCellConfig".

- [0792] As one embodiment, a name of one IE carrying the second information block comprises "DownlinkConfig".
- [0793] As one embodiment, a name of one IE carrying the second information block comprises "UplinkConfig".
- [0794] As one embodiment, a name of one IE carrying the second information block comprises "BWP-Downlink".
- [0795] As one embodiment, a name of one IE carrying the second information block comprises "BWP-Uplink".
- [0796] As one embodiment, a name of one IE carrying the second information block comprises "BWP".
- [0797] As one embodiment, the second information block is borne by MAC CE signaling.
- [0798] As one embodiment, the second information block is borne by physical layer signaling.
- [0799] As one embodiment, the second information block is borne by DCI signaling.
- [0800] As one embodiment, the second information block is carried by RRC signaling and MAC CE.
- [0801] As one embodiment, the second information block is carried by higher layer signaling and DCI.
- [0802] As one embodiment, the second information block and the first information block are borne by the same RRC IE.
- [0803] As one embodiment, the second information block and the first information block are borne by two RRC IEs, respectively.
- [0804] As one embodiment, for the specific definitions of a DownlinkConfigCommon IE, a DownlinkConfigCommonSIB IE, an UplinkConfigCommon IE, an UplinkConfigCommonSIB IE, a BWP-UplinkCommon IE, a BWP-UplinkDedicated IE, a BWP-DownlinkCommon IE, and a BWP-DownlinkDedicated IE, see Chapter 6.3.2 of 3GPP TS 38.331.
- [0805] As one embodiment, the second information block explicitly indicates the reference frequency domain resource set.
- [0806] As one embodiment, the second information block implicitly indicates the reference frequency domain resource set.
- [0807] As one embodiment, the second information block indicates subcarriers included in the reference frequency domain resource set.
- [0808] As one embodiment, the second information block indicates each subcarrier included in the reference frequency domain resource set.
- [0809] As one embodiment, the second information block indicates indexes of subcarriers included in the reference frequency domain resource set.

[0810] As one embodiment, the second information block indicates an index of each subcarrier included in the reference frequency domain resource set.

[0811] As one embodiment, the second information block indicates an index of a starting subcarrier of the reference frequency domain resource set.

[0812] As one embodiment, the second information block indicates the number of subcarriers included in the reference frequency domain resource set.

[0813] As one embodiment, the second information block indicates the number of consecutive subcarriers included in the reference frequency domain resource set.

[0814] As one embodiment, the second information block indicates an index of a starting subcarrier of the reference frequency domain resource set and the number of consecutive subcarriers included.

[0815] As one embodiment, the second information block indicates RBs included in the reference frequency domain resource set.

[0816] As one embodiment, the second information block indicates each RB included in the reference frequency domain resource set.

[0817] As one embodiment, the second information block indicates indexes of RBs included in the reference frequency domain resource set.

[0818] As one embodiment, the second information block indicates an index of each RB included in the reference frequency domain resource set.

[0819] As one embodiment, the second information block indicates an index of a starting RB of the reference frequency domain resource set.

[0820] As one embodiment, the second information block indicates the number of RBs included in the reference frequency domain resource set.

[0821] As one embodiment, the second information block indicates the number of consecutive RBs included in the reference frequency domain resource set.

[0822] As one embodiment, the second information block indicates an index of a starting RB of the reference frequency domain resource set and the number of consecutive RBs included.

[0823] As one embodiment, the second information block indicates locations of RBs included in the reference frequency domain resource set relative to one Common Resource Block (CRB).

[0824] As one embodiment, the second information block indicates a location of each RB included in the reference frequency domain resource set relative to one CRB.

[0825] As one embodiment, the second information block indicates a location of a starting RB of the reference frequency domain resource set relative to one CRB.

[0826] As one embodiment, the second information block indicates offsets of RBs included in the reference frequency domain resource set relative to one CRB.

[0827] As one embodiment, the second information block indicates an offset of each RB included in the reference frequency domain resource set relative to one CRB.

[0828] As one embodiment, the second information block indicates an offset of a starting RB of the reference frequency domain resource set relative to one CRB.

[0829] As one embodiment, the second information block indicates locations of RBs included in the reference frequency domain resource set relative to a CRB 0.

[0830] As one embodiment, the second information block indicates a location of each RB included in the reference frequency domain resource set relative to a CRB 0.

[0831] As one embodiment, the second information block indicates a location of a starting RB of the reference frequency domain resource set relative to a CRB 0.

[0832] As one embodiment, the second information block indicates offsets of RBs included in the reference frequency domain resource set relative to a CRB 0.

[0833] As one embodiment, the second information block indicates an offset of each RB included in the reference frequency domain resource set relative to a CRB 0.

[0834] As one embodiment, the second information block indicates an offset of a starting RB of the reference frequency domain resource set relative to a CRB 0.

[0835] As one embodiment, for the specific definitions of a CRB and a CRB 0, see Chapter 4 of 3GPP TS 38.211.

[0836] As one embodiment, the second information block indicates a reference frequency domain resource pool, and the reference frequency domain resource set belongs to the reference frequency domain resource pool.

[0837] As one embodiment, the second information block indicates the reference frequency domain resource pool, and the reference frequency domain resource set comprises at least one RB in the reference frequency domain resource pool that overlaps with at least one BWP.

[0838] As one embodiment, the second information block indicates the reference frequency domain resource pool, and the reference frequency domain resource set comprises all RBs in the reference frequency domain resource pool that overlap with at least one BWP.

[0839] As one embodiment, the second information block indicates the reference frequency domain resource pool, and the reference frequency domain resource set comprises at least one RB in the reference frequency domain resource pool that overlaps with one BWP.

[0840] As one embodiment, the second information block indicates the reference frequency domain resource pool, and the reference frequency domain resource set comprises all RBs in the reference frequency domain resource pool that overlap with one BWP.

[0841] As one embodiment, the second information block indicates the reference frequency domain resource pool, and the reference frequency domain resource set comprises at least one RB

in the reference frequency domain resource pool that overlaps with one DL BWP.

[0842] As one embodiment, the second information block indicates the reference frequency domain resource pool, and the reference frequency domain resource set comprises all RBs in the reference frequency domain resource pool that overlap with one DL BWP.

[0843] As one embodiment, the second information block indicates the reference frequency domain resource pool, and the reference frequency domain resource set comprises at least one RB in the reference frequency domain resource pool that overlaps with a UL BWP in a pair of BWPs (a DL BWP and the UL BWP).

[0844] As one embodiment, the second information block indicates the reference frequency domain resource pool, and the reference frequency domain resource set comprises all RBs in the reference frequency domain resource pool that overlap with a UL BWP in a pair of BWPs (a DL BWP and the UL BWP).

[0845] As one embodiment, the reference frequency domain resource pool comprises one or more RBs.

[0846] As one embodiment, the reference frequency domain resource pool comprises a plurality of consecutive RBs.

[0847] As one embodiment, the second information block indicates each RB of the reference frequency domain resource pool.

[0848] As one embodiment, the second information block indicates a starting RB of the reference frequency domain resource pool.

[0849] As one embodiment, the second information block indicates the number of consecutive RBs included in the reference frequency domain resource pool.

[0850] As one embodiment, the second information block indicates a starting RB of the reference frequency domain resource pool and the number of consecutive RBs included.

[0851] As one embodiment, the reference time domain resource set is configured for one serving cell, and the reference frequency domain resource set is configured for the one serving cell; and on the one serving cell, the uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters belongs, in the frequency domain, to the reference frequency domain resource set.

[0852] As one embodiment, the reference time domain resource set is configured for one serving cell, and the reference frequency domain resource set is configured for the one serving cell; and on one BWP of the one serving cell, the uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters belongs, in the frequency domain, to a frequency domain resource where the reference frequency domain resource set and the one BWP of the one serving cell overlap.

[0853] As one embodiment, the reference time domain resource set is configured for one serving cell, and the reference frequency domain resource set is configured for the one serving cell; and on one UL BWP of the one serving cell, the uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters belongs, in the frequency domain, to a frequency domain resource where the reference frequency domain resource set and the one UL BWP of the one serving cell overlap.

[0854] As one embodiment, the reference time domain resource set is configured for one serving cell, and the reference frequency domain resource set is configured for the one serving cell; both the first PRACH occasion set and the second PRACH occasion set belong to the one serving cell; and on the one serving cell, a PRACH occasion in the second PRACH occasion set that belongs, in the time domain, to the reference time domain resource set belongs, in the frequency domain, to the reference frequency domain resource set.

[0855] As one embodiment, the reference time domain resource set is configured for one serving cell, and the reference frequency domain resource set is configured for the one serving cell; both the first PRACH occasion set and the second PRACH occasion set belong to the same BWP in the one serving cell; and a PRACH occasion in the second PRACH occasion set that belongs, in the time domain, to the reference time domain resource set belongs, in the frequency domain, to a frequency domain resource where the reference frequency domain resource set and the same BWP overlap.

[0856] As one embodiment, the reference time domain resource set is configured for one serving cell, and the reference frequency domain resource set is configured for the one serving cell; both the first PRACH occasion set and the second PRACH occasion set belong to the same UL BWP in the one serving cell; and a PRACH occasion in the second PRACH occasion set that belongs, in the time domain, to the reference time domain resource set belongs, in the frequency domain, to a frequency domain resource where the reference frequency domain resource set and the same UL BWP overlap.

[0857] As one embodiment, "the reference time domain resource set is configured for one serving cell" comprises: information indicating the reference time domain resource set belongs to configuration information of the one serving cell.

[0858] As one embodiment, "the reference time domain resource set is configured for one serving cell" comprises: the reference time domain resource set is applied to all BWPs of the one serving cell.

[0859] As one embodiment, "the reference time domain resource set is configured for one serving cell" comprises: information indicating the reference time domain resource set belongs to one IE ServingCellConfig used for configuring the one serving cell.

[0860] As one embodiment, "the reference time domain resource set is configured for one serving cell" comprises: information indicating the reference time domain resource set belongs to one IE ServingCellConfigCommon used for configuring the one serving cell.

[0861] As one embodiment, "the reference time domain resource set is configured for one serving cell" comprises: information indicating the reference time domain resource set belongs to at least one of one IE ServingCellConfig or IE ServingCellConfigCommon used for configuring the one serving cell.

[0862] As one embodiment, "the reference frequency domain resource set is configured for the one serving cell" comprises: information indicating the reference frequency domain resource set belongs to configuration information of the one serving cell.

[0863] As one embodiment, "the reference frequency domain resource set is configured for the one serving cell" comprises: the reference frequency domain resource set is applied to all BWPs of the one serving cell.

[0864] As one embodiment, "the reference frequency domain resource set is configured for the one serving cell" comprises: the reference frequency domain resource set and a BWP of the one serving cell are configured, respectively.

[0865] As one embodiment, "the reference frequency domain resource set is configured for the one serving cell" comprises: information indicating the reference frequency domain resource set belongs to one IE ServingCellConfig used for configuring the one serving cell.

[0866] As one embodiment, "the reference frequency domain resource set is configured for the one serving cell" comprises: information indicating the reference frequency domain resource set belongs to one IE ServingCellConfigCommon used for configuring the one serving cell.

[0867] As one embodiment, "the reference frequency domain resource set is configured for the one serving cell" comprises: information indicating the reference frequency domain resource set belongs to at least one of one IE ServingCellConfig or IE ServingCellConfigCommon used for configuring the one serving cell.

[0868] As one embodiment, "the reference time domain resource set is configured for one serving cell" comprises: information indicating the reference time domain resource set belongs to configuration information of the one serving cell; and "the reference frequency domain resource set is configured for the one serving cell" comprises: information indicating the reference frequency domain resource set belongs to configuration information of the one serving cell.

[0869] As one embodiment, "the reference time domain resource set is configured for one serving cell" comprises: the reference time domain resource set is applied to all BWPs of the one serving cell; and "the reference frequency domain resource set is configured for the one serving cell" comprises: the reference frequency domain resource set is applied to all BWPs of the one

serving cell.

[0870] As one embodiment, "the reference time domain resource set is configured for one serving cell" comprises: information indicating the reference time domain resource set belongs to one IE ServingCellConfig used for configuring the one serving cell; and "the reference frequency domain resource set is configured for the one serving cell" comprises: information indicating the reference frequency domain resource set belongs to one IE ServingCellConfig used for configuring the one serving cell.

[0871] As one embodiment, "the reference time domain resource set is configured for one serving cell" comprises: information indicating the reference time domain resource set belongs to one IE ServingCellConfigCommon used for configuring the one serving cell; and "the reference frequency domain resource set is configured for the one serving cell" comprises: information indicating the reference frequency domain resource set belongs to one IE ServingCellConfigCommon used for configuring the one serving cell.

[0872] As one embodiment, the reference time domain resource set is configured for at least one BWP, and the reference frequency domain resource set is configured for the at least one BWP; and on any BWP in the at least one BWP, the uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters belongs, in the frequency domain, to the reference frequency domain resource set.

[0873] As one embodiment, the reference time domain resource set is configured for at least one BWP, and the reference frequency domain resource set is configured for the at least one BWP; and a given BWP is any BWP in the at least one BWP, and on the given BWP, the uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters belongs, in the frequency domain, to a frequency domain resource where the reference frequency domain resource set and the given BWP overlap.

[0874] As one embodiment, the reference time domain resource set is configured for at least one BWP, and the reference frequency domain resource set is configured for the at least one BWP; and on one UL BWP in the at least one BWP, the uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters belongs, in the frequency domain, to the reference frequency domain resource set.

[0875] As one embodiment, the reference time domain resource set is configured for at least one BWP, and the reference frequency domain resource set is configured for the at least one BWP; a given BWP is one UL BWP in the at least one BWP, and on the given BWP, the uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters belongs, in the frequency domain, to a frequency domain resource where the reference frequency domain resource set and the given BWP overlap.

[0876] As one embodiment, the reference time domain resource set is configured for at least one BWP, and the reference frequency domain resource set is configured for the at least one BWP; both the first PRACH occasion set and the second PRACH occasion set belong to the at least one BWP; and a PRACH occasion in the second PRACH occasion set that belongs, in the time domain, to the reference time domain resource set belongs, in the frequency domain, to the reference frequency domain resource set.

[0877] As one embodiment, the reference time domain resource set is configured for at least one BWP, and the reference frequency domain resource set is configured for the at least one BWP; both the first PRACH occasion set and the second PRACH occasion set belong to the same BWP in the at least one BWP; and a PRACH occasion in the second PRACH occasion set that belongs, in the time domain, to the reference time domain resource set belongs, in the frequency domain, to a frequency domain resource where the reference frequency domain resource set and the same BWP overlap.

[0878] As one embodiment, "the reference time domain resource set is configured for at least one BWP" comprises: information indicating the reference time domain resource set belongs to configuration information of the at least one BWP.

[0879] As one embodiment, "the reference time domain resource set is configured for at least one BWP" comprises: the reference time domain resource set is applied to the at least one BWP.

[0880] As one embodiment, "the reference frequency domain resource set is configured for the at least one BWP" comprises: information indicating the reference frequency domain resource set belongs to configuration information of the at least one BWP.

[0881] As one embodiment, "the reference frequency domain resource set is configured for the at least one BWP" comprises: the reference frequency domain resource set is applied to the at least one BWP.

[0882] As one embodiment, "the reference frequency domain resource set is configured for the at least one BWP" comprises: the reference frequency domain resource set belongs to the at least one BWP.

[0883] As one embodiment, "the reference frequency domain resource set is configured for the at least one BWP" comprises: the reference frequency domain resource set comprises some or all of frequency domain resources in each BWP of the at least one BWP.

[0884] As one embodiment, "the reference time domain resource set is configured for at least one BWP" comprises: information indicating the reference time domain resource set belongs to configuration information of the at least one BWP; and "the reference frequency domain resource set is configured for the at least one BWP" comprises: information indicating the reference frequency domain resource set belongs to configuration information of the at least one BWP.

[0885] As one embodiment, "the reference time domain resource set is configured for at least one BWP" comprises: the reference time domain resource set is applied to the at least one BWP; and "the reference frequency domain resource set is configured for the at least one BWP" comprises: the reference frequency domain resource set is applied to the at least one BWP.

[0886] As one embodiment, the reference time domain resource set is configured for one BWP, and the reference frequency domain resource set is configured for the one BWP; and on the one BWP, the uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters belongs, in the frequency domain, to the reference frequency domain resource set.

[0887] As one embodiment, the reference time domain resource set is configured for one BWP, and the reference frequency domain resource set is configured for the one BWP; and on the one BWP, the uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters belongs, in the frequency domain, to a frequency domain resource where the reference frequency domain resource set and the one BWP overlap.

[0888] As one embodiment, the reference time domain resource set is configured for one BWP, and the reference frequency domain resource set is configured for the one BWP; both the first PRACH occasion set and the second PRACH occasion set belong to the one BWP; and a PRACH occasion in the second PRACH occasion set that belongs, in the time domain, to the reference time domain resource set belongs, in the frequency domain, to the reference frequency domain resource set.

[0889] As one embodiment, the reference time domain resource set is configured for one BWP, and the reference frequency domain resource set is configured for the one BWP; both the first PRACH occasion set and the second PRACH occasion set belong to the one BWP; and a PRACH occasion in the second PRACH occasion set that belongs, in the time domain, to the reference time domain resource set belongs, in the frequency domain, to a frequency domain resource where the reference frequency domain resource set and the one BWP overlap.

[0890] As one embodiment, "the reference time domain resource set is configured for one BWP" comprises: information indicating the reference time domain resource set belongs to configuration information of the one BWP.

[0891] As one embodiment, "the reference time domain resource set is configured for one BWP" comprises: the reference time domain resource set is applied to the one BWP.

[0892] As one embodiment, "the reference frequency domain resource set is configured for the one BWP" comprises: information indicating the reference frequency domain resource set belongs to configuration information of the one BWP.

[0893] As one embodiment, "the reference frequency domain resource set is configured for the one BWP" comprises: the reference frequency domain resource set is applied to the one BWP.

[0894] As one embodiment, "the reference frequency domain resource set is configured for the one BWP" comprises: the reference frequency domain resource set belongs to the one BWP.

[0895] As one embodiment, the reference time domain resource set is configured for a pair of BWPs (a DL BWP and a UL BWP), and the reference frequency domain resource set is configured for the pair of BWPs (the DL BWP and the UL BWP); and on the UL BWP of the pair of BWPs (the DL BWP and the UL BWP), the uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters belongs, in the frequency domain, to the reference frequency domain resource set.

[0896] As one embodiment, the reference time domain resource set is configured for a pair of BWPs (a DL BWP and a UL BWP), and the reference frequency domain resource set is configured for the pair of BWPs (the DL BWP and the UL BWP); and a given UL BWP is the UL BWP of the pair of BWPs (the DL BWP and the UL BWP), and on the given UL BWP, the uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters belongs, in the frequency domain, to a frequency domain resource where the reference frequency domain resource set and the given UL BWP overlap.

[0897] As one embodiment, the reference time domain resource set is configured for a pair of BWPs (a DL BWP and a UL BWP), and the reference frequency domain resource set is configured for the pair of BWPs (the DL BWP and the UL BWP); both the first PRACH occasion set and the second PRACH occasion set belong to the UL BWP of the pair of BWPs (the DL BWP and the UL BWP); and a PRACH occasion in the second PRACH occasion set that belongs, in the time domain, to the reference time domain resource set belongs, in the frequency domain, to the reference frequency domain resource set.

[0898] As one embodiment, the reference time domain resource set is configured for a pair of BWPs (a DL BWP and a UL BWP), and the reference frequency domain resource set is configured for the pair of BWPs (the DL BWP and the UL BWP); a given UL BWP is the UL BWP of the pair of BWPs (the DL BWP and the UL BWP), and both the first PRACH occasion set and the second PRACH occasion set belong to the given UL BWP; and a PRACH occasion in the second PRACH occasion set that belongs, in the time domain, to the reference time domain resource set belongs, in the frequency domain, to a frequency domain resource where the reference frequency domain resource set and the given UL BWP overlap.

[0899] As one embodiment, "the reference time domain resource set is configured for a pair of BWPs (a DL BWP and a UL BWP)" comprises: information indicating the reference time domain

resource set belongs to configuration information of the DL BWP of the pair of BWPs (the DL BWP and the UL BWP), or configuration information of the UL BWP of the pair of BWPs (the DL BWP and the UL BWP).

[0900] As one embodiment, "the reference time domain resource set is configured for a pair of BWPs (a DL BWP and a UL BWP)" comprises: the reference time domain resource set is applied to the pair of BWPs (the DL BWP and the UL BWP).

[0901] As one embodiment, "the reference frequency domain resource set is configured for the pair of BWPs (the DL BWP and the UL BWP)" comprises: information indicating the reference frequency domain resource set belongs to configuration information of the DL BWP of the pair of BWPs (the DL BWP and the UL BWP), or configuration information of the UL BWP of the pair of BWPs (the DL BWP and the UL BWP).

[0902] As one embodiment, "the reference frequency domain resource set is configured for the pair of BWPs (the DL BWP and the UL BWP)" comprises: the reference frequency domain resource set is applied to the pair of BWPs (the DL BWP and the UL BWP).

[0903] As one embodiment, "the reference frequency domain resource set is configured for the pair of BWPs (the DL BWP and the UL BWP)" comprises: the reference frequency domain resource set belongs to the DL BWP of the pair of BWPs (the DL BWP and the UL BWP).

[0904] As one embodiment, "the reference frequency domain resource set is configured for the pair of BWPs (the DL BWP and the UL BWP)" comprises: the reference frequency domain resource set belongs to the UL BWP of the pair of BWPs (the DL BWP and the UL BWP).

[0905] As one embodiment, the reference time domain resource set is configured for one DL BWP, and the reference frequency domain resource set is configured for the one DL BWP; both a first UL BWP is the UL BWP of a pair of BWPs (a DL BWP and a UL BWP) to which the one DL BWP belongs; and on the first UL BWP, the uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters belongs, in the frequency domain, to the reference frequency domain resource set.

[0906] As one embodiment, the reference time domain resource set is configured for one DL BWP, and the reference frequency domain resource set is configured for the one DL BWP; a first UL BWP is the UL BWP of a pair of BWPs (a DL BWP and a UL BWP) to which the one DL BWP belongs; and on the first UL BWP, the uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters belongs, in the frequency domain, to a frequency domain resource where the reference frequency domain resource set and the first UL BWP overlap.

[0907] As one embodiment, the reference time domain resource set is configured for one DL BWP, the reference frequency domain resource set is configured for the one DL BWP, both the

first PRACH occasion set and the second PRACH occasion set belong to the same UL BWP, and the same UL BWP and the one DL BWP are a pair of BWPs (a DL BWP and a UL BWP); and a PRACH occasion in the second PRACH occasion set that belongs, in the time domain, to the reference time domain resource set belongs, in the frequency domain, to the reference frequency domain resource set.

[0908] As one embodiment, the reference time domain resource set is configured for one DL BWP, the reference frequency domain resource set is configured for the one DL BWP, both the first PRACH occasion set and the second PRACH occasion set belong to the same UL BWP, and the same UL BWP and the one DL BWP are a pair of BWPs (a DL BWP and a UL BWP); and a PRACH occasion in the second PRACH occasion set that belongs, in the time domain, to the reference time domain resource set belongs, in the frequency domain, to a frequency domain resource where the reference frequency domain resource set and the same UL BWP overlap.

[0909] As one embodiment, "the reference time domain resource set is configured for one DL BWP" comprises: information indicating the reference time domain resource set belongs to configuration information of the one DL BWP.

[0910] As one embodiment, "the reference time domain resource set is configured for one DL BWP" comprises: the reference time domain resource set is applied to the one DL BWP.

[0911] As one embodiment, "the reference frequency domain resource set is configured for the one DL BWP" comprises: information indicating the reference frequency domain resource set belongs to configuration information of the one DL BWP.

[0912] As one embodiment, "the reference frequency domain resource set is configured for the one DL BWP" comprises: the reference frequency domain resource set is applied to the one DL BWP.

[0913] As one embodiment, "the reference frequency domain resource set is configured for the one DL BWP" comprises: the reference frequency domain resource set belongs to the one DL BWP.

[0914] **Embodiment 12**

[0915] Embodiment 12 illustrates a structural block diagram of a processing apparatus used in a first node device according to one embodiment of the present application, as shown in FIG. 12. In FIG. 12, a processing apparatus 1200 in the first node device comprises a first receiver 1201 and a first transmitter 1202.

[0916] As one embodiment, the first node device is user equipment.

[0917] As one embodiment, the first node device is a relay node device.

[0918] As one embodiment, the first receiver 1201 comprises at least one of {an antenna 452, a receiving device 454, a receiving processor 456, a multi-antenna receiving processor 458, a

controller/processor 459, a memory 460, and a data source 467} in Embodiment 4.

[0919] As one embodiment, the first transmitter 1202 comprises at least one of {the antenna 452, a transmitting device 454, a transmitting processor 468, a multi-antenna transmitting processor 457, the controller/processor 459, the memory 460, and the data source 467} in Embodiment 4.

[0920] The first receiver 1201 receives a first information block, wherein the first information block indicates a reference time domain resource set, and the reference time domain resource set comprises one or more symbols configured as DL by higher layer parameters.

[0921] The first transmitter 1202 transmits first random access preambles in first PRACH occasions, wherein a candidate set of the first PRACH occasions is a first PRACH occasion set or a second PRACH occasion set, the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain, and the second PRACH occasion set and the reference time domain resource set overlap in the time domain.

[0922] In Embodiment 12, the transmission of the first random access preambles belongs to one of a first type of random access process or a second type of random access process; when the transmission of the first random access preambles belongs to the first type of random access process, the candidate set of the first PRACH occasions is the first PRACH occasion set; and when the transmission of the first random access preambles belongs to the second type of random access process, the candidate set of the first PRACH occasions is the second PRACH occasion set.

[0923] As one embodiment, one of the first type of random access process and the second type of random access process is contention based, and the other is contention free.

[0924] As one embodiment, one of the first type of random access process and the second type of random access process is a four-step random access process, and the other is a two-step random access process.

[0925] As one embodiment, a priority of the first type of random access process is lower than a priority of the second type of random access process.

[0926] As one embodiment, the first type of random access process is initiated for a first event set, and the second type of random access process is initiated for a second event set; and the first event set comprises one or more events, the second event set comprises one or more events, and any event in the first event set does not belong to the second event set.

[0927] As one embodiment, any feature to the first type of random access process is not a feature to the second type of random access process.

[0928] As one embodiment, in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters, at least one subcarrier or at least one resource block is used for uplink transmission.

[0929] As one embodiment, it comprises:

the first receiver 1201 receiving a second information block,

wherein the second information block indicates a reference frequency domain resource set; the reference frequency domain resource set comprises at least one subcarrier or at least one RB used for uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters; and a PRACH occasion in the second PRACH occasion set that belongs, in the time domain, to the reference time domain resource set belongs, in the frequency domain, to the reference frequency domain resource set.

[0930] **Embodiment 13**

[0931] Embodiment 13 illustrates a structural block diagram of a processing apparatus used in a second node device according to one embodiment of the present application, as shown in FIG. 13. In FIG. 13, a processing apparatus 1300 in the second node device comprises a second transmitter 1301 and a second receiver 1302.

[0932] As one embodiment, the second node device is a base station device.

[0933] As one embodiment, the second node device is user equipment.

[0934] As one embodiment, the second node device is a relay node device.

[0935] As one embodiment, the second transmitter 1301 comprises at least one of {an antenna 420, a transmitting device 418, a transmitting processor 416, a multi-antenna transmitting processor 471, a controller/processor 475, and a memory 476} in Embodiment 4.

[0936] As one embodiment, the second receiver 1302 comprises at least one of {the antenna 420, a receiving device 418, a receiving processor 470, a multi-antenna receiving processor 472, the controller/processor 475, and the memory 476} in Embodiment 4.

[0937] The second transmitter 1301 transmits a first information block, wherein the first information block indicates a reference time domain resource set, and the reference time domain resource set comprises one or more symbols configured as DL by higher layer parameters.

[0938] The second receiver 1302 receives first random access preambles in first PRACH occasions, wherein a candidate set of the first PRACH occasions is a first PRACH occasion set or a second PRACH occasion set, the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain, and the second PRACH occasion set and the reference time domain resource set overlap in the time domain.

[0939] In Embodiment 13, the reception of the first random access preambles belongs to one of a first type of random access process or a second type of random access process; when the reception of the first random access preambles belongs to the first type of random access process, the candidate set of the first PRACH occasions is the first PRACH occasion set; and when the reception of the first random access preambles belongs to the second type of random access

process, the candidate set of the first PRACH occasions is the second PRACH occasion set.

[0940] As one embodiment, one of the first type of random access process and the second type of random access process is contention based, and the other is contention free.

[0941] As one embodiment, one of the first type of random access process and the second type of random access process is a four-step random access process, and the other is a two-step random access process.

[0942] As one embodiment, a priority of the first type of random access process is lower than a priority of the second type of random access process.

[0943] As one embodiment, the first type of random access process is initiated for a first event set, and the second type of random access process is initiated for a second event set; and the first event set comprises one or more events, the second event set comprises one or more events, and any event in the first event set does not belong to the second event set.

[0944] As one embodiment, any feature to the first type of random access process is not a feature to the second type of random access process.

[0945] As one embodiment, in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters, at least one subcarrier or at least one resource block is used for uplink transmission.

[0946] As one embodiment, it comprises:

the second transmitter 1301 transmitting a second information block,

wherein the second information block indicates a reference frequency domain resource set; the reference frequency domain resource set comprises at least one subcarrier or at least one RB used for uplink transmission in at least one of symbols of the reference time domain resource set that are configured as DL by the higher layer parameters; and a PRACH occasion in the second PRACH occasion set that belongs, in the time domain, to the reference time domain resource set belongs, in the frequency domain, to the reference frequency domain resource set.

[0947] Those of ordinarily skilled in the art can understand that all or some of the steps in the above method can be completed by instructing relevant hardware through a program, and the program can be stored in a computer-readable storage medium, such as a read-only memory, a hard disk or an optical disk. Optionally, all or some of the steps of the above embodiments can also be implemented using one or more integrated circuits. Accordingly, each module unit in the above embodiments can be implemented in the form of hardware or in the form of a software function module. The present application is not limited to any specific form of combinations of software and hardware. The user equipment, terminals and UE in the present application include but are not limited to drones, communication modules on drones, remote-controlled airplanes, aircrafts, small airplanes, mobile phones, tablet computers, notebook computers, vehicle-mounted

communication devices, wireless sensors, Internet cards, Internet of Things terminals, RFID terminals, NB-IOT terminals, Machine Type Communication (MTC) terminals, enhanced MTC (eMTC) terminals, data cards, Internet cards, vehicle-mounted communication devices, low-cost mobile phones, low-cost tablet computers, and other wireless communication devices. The base stations or system devices in the present application include, but are not limited to, macrocellular base stations, microcellular base stations, femtocells, relay base stations, NR node Bs (gNBs), Transmitter Receiver Points (TRPs), GNSS, relay satellites, satellite base stations, aerial base stations, Road Side Units (RSUs), drones, test devices (such as transceiving apparatuses or signaling testers that simulate some functions of base stations), and other wireless communication devices.

[0948] The above is only a preferred embodiment of the present application and is not used for limiting the scope of protection of the present application. Any changes and modifications made based on the embodiments described in the specification, if some or all of similar technical effects can be obtained, should be deemed obvious and belong to the scope of protection of the present invention.

1. A first node device for wireless communication, comprising:
 - a first receiver receiving a first information block, wherein the first information block indicates a reference time domain resource set, and the reference time domain resource set comprises one or more symbols configured as DL by higher layer parameters; and
 - a first transmitter transmitting first random access preambles in first PRACH occasions, wherein a candidate set of the first PRACH occasions is a first PRACH occasion set or a second PRACH occasion set, the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain, and the second PRACH occasion set and the reference time domain resource set overlap in the time domain;wherein the transmission of the first random access preambles belongs to one of a first type of random access process or a second type of random access process; when the transmission of the first random access preambles belongs to the first type of random access process, a candidate set of the first PRACH occasions is the first PRACH occasion set; and when the transmission of the first random access preambles belongs to the second type of random access process, the candidate set of the first PRACH occasions is the second PRACH occasion set.
2. The first node device according to claim 1, wherein one of the first type of random access process and the second type of random access process is contention based, and the other is contention-free based; or one of the first type of random access process and the second type of random access process is a 4-step random access process, and the other is a 2-step random access process.
3. The first node device according to claim 1 or 2, wherein a priority of the first type of random access process is lower than a priority of the second type of random access process.
4. The first node device according to any one of claims 1 to 3, wherein the first type of random access process is initiated for a first event set, and the second type of random access process is initiated for a second event set; and the first event set comprises one or more events, the second event set comprises one or more events, and any event in the first event set does not belong to the second event set.
5. The first node device according to any one of claims 1 to 4, wherein any feature applicable to the first type of random access process is not a feature applicable to the second type of random access process.
6. The first node device according to any one of claims 1 to 5, wherein at least one subcarrier or at least one resource block is used for uplink transmission in at least one of the symbols of the reference time domain resource set that are configured as DL by the higher layer parameters.

7. The first node device according to claim 6, comprising:

the first receiver receiving a second information block;

wherein the second information block indicates a reference frequency domain resource set; the reference frequency domain resource set comprises the at least one subcarrier or at least one RB used for the uplink transmission in the at least one of the symbols of the reference time domain resource set that are configured as DL by the higher layer parameters; and a PRACH occasion in the second PRACH occasion set that belongs to the reference time domain resource set in the time domain belongs to the reference frequency domain resource set in the frequency domain.

8. A second node device for wireless communication, comprising:

a second transmitter transmitting a first information block, wherein the first information block indicates a reference time domain resource set, and the reference time domain resource set comprises one or more symbols configured as DL by higher layer parameters; and

a second receiver receiving first random access preambles in first PRACH occasions, wherein a candidate set of the first PRACH occasions is a first PRACH occasion set or a second PRACH occasion set, the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain, and the second PRACH occasion set and the reference time domain resource set overlap in the time domain;

wherein the reception of the first random access preambles belongs to one of a first type of random access process or a second type of random access process; when the reception of the first random access preambles belongs to the first type of random access process, the candidate set of the first PRACH occasions is the first PRACH occasion set; and when the reception of the first random access preambles belongs to the second type of random access process, the candidate set of the first PRACH occasions is the second PRACH occasion set.

9. The second node device according to claim 8, wherein one of the first type of random access process and the second type of random access process is contention based, and the other is contention-free based; or one of the first type of random access process and the second type of random access process is a 4-step random access process, and the other is a 2-step random access process.

10. The second node device according to claim 8 or 9, wherein a priority of the first type of random access process is lower than a priority of the second type of random access process.

11. The second node device according to any one of claims 8 to 10, wherein the first type of random access process is initiated for a first event set, and the second type of random access process is initiated for a second event set; and the first event set comprises one or more events, the second event set comprises one or more events, and any event in the first event set does not belong to the second event set.

12. The second node device according to any one of claims 8 to 11, wherein any feature applicable to the first type of random access process is not a feature applicable to the second type of random access process.

13. The second node device according to any one of claims 8 to 12, wherein at least one subcarrier or at least one resource block is used for uplink transmission in at least one of the symbols of the reference time domain resource set that are configured as DL by the higher layer parameters.

14. The second node device according to claim 13, comprising:

the second transmitter transmitting a second information block;

wherein the second information block indicates a reference frequency domain resource set; the reference frequency domain resource set comprises the at least one subcarrier or at least one RB used for the uplink transmission in the at least one of the symbols of the reference time domain resource set that are configured as DL by the higher layer parameters; and a PRACH occasion in the second PRACH occasion set that belongs to the reference time domain resource set in the time domain belongs to the reference frequency domain resource set in the frequency domain.

15. A method used in a first node device for wireless communication, comprising:

receiving a first information block, wherein the first information block indicates a reference time domain resource set, and the reference time domain resource set comprises one or more symbols configured as DL by higher layer parameters; and

transmitting first random access preambles in first PRACH occasions, wherein a candidate set of the first PRACH occasions is a first PRACH occasion set or a second PRACH occasion set, the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain, and the second PRACH occasion set and the reference time domain resource set overlap in the time domain;

wherein the transmission of the first random access preambles belongs to one of a first type of random access process or a second type of random access process; when the transmission of the first random access preambles belongs to the first type of random access process, a candidate set of the first PRACH occasions is the first PRACH occasion set; and when the transmission of the first random access preambles belongs to the second type of random access process, the candidate set of the first PRACH occasions is the second PRACH occasion set.

16. The method in a first node device according to claim 15, wherein one of the first type of random access process and the second type of random access process is contention based, and the other is contention-free based; or one of the first type of random access process and the second type of random access process is a 4-step random access process, and the other is a 2-step random access process.

17. The method in a first node device according to claim 15 or 16, wherein a priority of the first type of random access process is lower than a priority of the second type of random access process.

18. The method in a first node device according to any one of claims 15 to 17, wherein the first type of random access process is initiated for a first event set, and the second type of random access process is initiated for a second event set; and the first event set comprises one or more events, the second event set comprises one or more events, and any event in the first event set does not belong to the second event set.

19. The method in a first node device according to any one of claims 15 to 18, wherein any feature applicable to the first type of random access process is not a feature applicable to the second type of random access process.

20. The method in a first node device according to any one of claims 15 to 19, wherein at least one subcarrier or at least one resource block is used for uplink transmission in at least one of the symbols of the reference time domain resource set that are configured as DL by the higher layer parameters.

21. The method in a first node device according to claim 20, comprising:

receiving a second information block;

wherein the second information block indicates a reference frequency domain resource set; the reference frequency domain resource set comprises the at least one subcarrier or at least one RB used for the uplink transmission in the at least one of the symbols of the reference time domain resource set that are configured as DL by the higher layer parameters; and a PRACH occasion in the second PRACH occasion set that belongs to the reference time domain resource set in the time domain belongs to the reference frequency domain resource set in the frequency domain.

22. A method used in a second node device for wireless communication, comprising:

transmitting a first information block, wherein the first information block indicates a reference time domain resource set, and the reference time domain resource set comprises one or more symbols configured as DL by higher layer parameters; and

receiving first random access preambles in first PRACH occasions, wherein a candidate set of the first PRACH occasions is a first PRACH occasion set or a second PRACH occasion set, the first PRACH occasion set and the reference time domain resource set are orthogonal in the time domain, and the second PRACH occasion set and the reference time domain resource set overlap in the time domain;

wherein the reception of the first random access preambles belongs to one of a first type of random access process or a second type of random access process; when the reception of the first random access preambles belongs to the first type of random access process, the candidate set of

the first PRACH occasions is the first PRACH occasion set; and when the reception of the first random access preambles belongs to the second type of random access process, the candidate set of the first PRACH occasions is the second PRACH occasion set.

23. The method in a second node device according to claim 22, wherein one of the first type of random access process and the second type of random access process is contention based, and the other is contention-free based; or one of the first type of random access process and the second type of random access process is a 4-step random access process, and the other is a 2-step random access process.

24. The method in a second node device according to claim 22 or 23, wherein a priority of the first type of random access process is lower than a priority of the second type of random access process.

25. The method in a second node device according to any one of claims 22 to 24, wherein the first type of random access process is initiated for a first event set, and the second type of random access process is initiated for a second event set; and the first event set comprises one or more events, the second event set comprises one or more events, and any event in the first event set does not belong to the second event set.

26. The method in a second node device according to any one of claims 22 to 25, wherein any feature applicable to the first type of random access process is not a feature applicable to the second type of random access process.

27. The method in a second node device according to any one of claims 22 to 26, wherein at least one subcarrier or at least one resource block is used for uplink transmission in at least one of the symbols of the reference time domain resource set that are configured as DL by the higher layer parameters.

28. The method in a second node device according to claim 27, comprising:

transmitting a second information block;

wherein the second information block indicates a reference frequency domain resource set; the reference frequency domain resource set comprises the at least one subcarrier or at least one RB used for the uplink transmission in the at least one of the symbols of the reference time domain resource set that are configured as DL by the higher layer parameters; and a PRACH occasion in the second PRACH occasion set that belongs to the reference time domain resource set in the time domain belongs to the reference frequency domain resource set in the frequency domain.