RESOURCE MULTIPLEXING METHOD AND APPARATUS

[0001] ~~This application claims priority to Chinese Patent Application No. 202010414384.7, filed with the China National Intellectual Property Administration on May 15, 2020 and entitled "RESOURCE MULTIPLEXING METHOD AND APPARATUS", which is incorporated herein by reference in its entirety.~~

TECHNICAL FIELD

[0002] This application relates to the field of communication technologies, and in particular, to a resource multiplexing method and apparatus.

BACKGROUND

[0003] With continuous development of mobile communication technologies, spectrum resources become increasingly insufficient. To improve spectrum utilization, base stations will be deployed more densely in the future. In addition, dense deployment may further avoid coverage holes. In a conventional cellular network architecture, a base station establishes a connection to a core network through an optical fiber. However, deployment costs of optical fibers are very high in many scenarios. A relay node (relay node, RN) establishes a connection to the core network over a wireless backhaul link, to reduce a part of the deployment costs of the optical fibers.

[0004] Currently, an in-band relay solution is provided. In-band relay is a relay solution in which a backhaul link and an access link share a same frequency band. The in-band relay is generally subject to a half-duplex constraint. Specifically, when receiving a downlink signal sent by a parent node of the relay node, the relay node cannot send a downlink signal to a child node of the relay node, and when receiving an uplink signal sent by the child node of the relay node, the relay node cannot send an uplink signal to the parent node of the relay node. An in-band relay solution in a next-generation wireless communication system (new radio, NR) is referred to as integrated access and backhaul (integrated access and backhaul, IAB). When an IAB node operates normally, resource multiplexing is performed on an access link and a backhaul link in a time division manner, a space division manner, or a frequency division manner.

guard interval information reported by the first node, where for example, the configured guard interval information is completely or partially the same as the guard interval information reported by the first node. Alternatively, the second node may configure the guard interval information without reference to the guard interval information reported by the first node.

[0011] In still another design, a value range of the first symbol quantity is [–3,4], a value range of the second symbol quantity is [–3,4], a value range of the third symbol quantity is [–3,4], and a value range of the fourth symbol quantity is [–3,4], where the first symbol quantity, the second symbol quantity, the third symbol quantity, and the fourth symbol quantity are integers.

[0012] In still another design, a value range of the fifth symbol quantity is [–3,4], a value range of the sixth symbol quantity is [–3,4], a value range of the seventh symbol quantity is [–3,4], and a value range of the eighth symbol quantity is [–3,4], where the fifth symbol quantity, the sixth symbol quantity, the seventh symbol quantity, and the eighth symbol quantity are integers.

[0013] In still another design, the first timing mode is a timing mode 1, and the second timing mode is a timing mode 6; the first timing mode is a timing mode 1, and the second timing mode is a timing mode 7; or the first timing mode is a timing mode 6, and the second timing mode is a timing mode 7. In this design, the timing mode 1, the timing mode 6, and the timing mode~~module~~ 7 are used as examples. However, this application is not limited to the example timing modes, and a solution of this application may be further applicable to more timing modes.

[0014] In still another design, the method further includes: reporting, by the first node, a timing difference between the first timing mode and the second timing mode to the second node. In this design, the first node may accurately determine the time domain position of the MT resource based on the guard interval information associated with the different used timing modes and the timing difference. For example, the timing difference may be reported by the first node. The first timing mode may be the timing mode 1, and the second timing mode may be the timing mode~~module~~ 6.

[0015] In still another design, the method further includes: receiving, by the first node, a timing difference that is between the first timing mode and the second timing mode and that is configured by the second node. In this design, the first node may accurately determine the time domain position of the MT resource based on the guard interval information associated with the different used timing modes and the timing difference. For example, the timing difference may be configured by the second node. The first timing mode may be the timing mode 1, and the second timing mode may be the timing mode~~module~~ 7.

indication of a parent node.

[0077] DU unavailable resource: The DU unavailable resource is a resource that is always unavailable to the DU.

[0078] A resource multiplexing method provided in embodiments of this application may be applied to a wireless communication system having a relay node, as shown in FIG. 3. It should be understood that FIG. 3 is merely an example for description, and quantities of user equipments and relay devices that are included in the wireless communication system are not specifically limited. In NR, the relay device is generally referred to as an IAB node. In LTE, the relay device is generally referred to as an RN.

[0079] The communication system shown in FIG. 3 may include various communication systems, for example, may be an internet of things (internet of things, IoT) communication system, a narrowband internet of things (narrowband internet of things, NB-IoT) communication system, or a long term evolution (long term evolution, LTE) communication system, may be a 5th generation (5th generation, 5G) communication system or a next-generation communication system, for example, 6G, may be a hybrid architecture of LTE and 5G, or may be a 5G NR system, a global system for mobile communication (global system for mobile communication, GSM), a universal mobile telecommunications system~~mobile communication system~~ (universal mobile telecommunications system, UMTS), a code division multiple access (code division multiple access, CDMA) system, and a new communication system that will emerge in future communication development.

[0080] The parent node in embodiments of this application is a common base station, and the common base station may also be referred to as a radio access network (radio access network, RAN) node (or device). For example, the common base station may be a next-generation NodeB (next-generation NodeB, gNB), a transmission reception point (transmission reception point, TRP), an evolved NodeB (evolved NodeB, eNB), a radio network controller (radio network controller, RNC), a NodeB (NodeB, NB), a base station controller (base station controller, BSC), a base transceiver station (base transceiver station, BTS), a home base station (for example, a home evolved NodeB, or a home NodeB, HNB), a baseband unit (baseband unit, BBU), or a transmission point TP.

[0081] For example, a structure of the common base station in embodiments of this application may be shown in FIG. 4. Specifically, the base station may be divided into a central unit (central unit, CU) and at least one distributed unit (distributed unit, DU). The CU may be configured to

manage or control the at least one DU, which may also be referred to as that the CU is connected to the at least one DU. In this structure, protocol layers of a radio access network device in the communication system may be split. Some protocol layers are controlled by the CU in a centralized manner, functions of some or all of remaining protocol layers are distributed in the DU, and the CU controls the DU in a centralized manner. For example, the base station is a gNB. Protocol layers of the gNB include a radio resource control (radio resource control, RRC) layer, a service data adaptation protocol (service data adaptation protocol, SDAP) layer, a packet data convergence protocol (packet data convergence protocol, PDCP) layer, a radio link control (radio link control, RLC) layer, a media access control ~~sublayer~~ (media access control, MAC) layer, and a physical layer. For example, the CU may be configured to implement functions of the RRC layer, the SDAP layer, and the PDCP layer, and the DU may be configured to implement functions of the RLC layer, the MAC layer, and the physical layer. Protocol stacks included in the CU and the DU are not specifically limited in embodiments of this application.

[0082] For example, the CU in embodiments of this application may be further divided into one control plane (CU-control plane, CU-CP) network element and a plurality of user plane (CU-user plane, CU-UP) network elements. The CU-CP may be used for control plane management, and the CU-UP may be used for user plane data transmission. An interface between the CU-CP and the CU-UP may be an E1 interface. An interface between the CU-CP and the DU may be F1-C, and is used for control plane signaling transmission. An interface between the CU-UP and the DU may be F1-U, and is used for user plane data transmission. The CU-UP and the CU-UP may be connected through an Xn-U interface, to perform user plane data transmission. For example, a gNB is used as an example. A structure of the gNB may be shown in FIG. 5.

[0083] The IAB node in embodiments of this application may include an MT function and a DU function. To be specific, the IAB node communicates with a parent node through the MT, and the DU is a base station function module of the IAB node, is configured to implement functions of an RLC layer, a MAC layer, and a physical layer, and is mainly responsible for scheduling and physical signal generation and sending. That is, the IAB node communicates with a child node and UE through the DU, as shown in FIG. 6. Both the MT and the DU of the IAB node have complete transceiver modules, and there is an interface between the MT and the DU. However, it should be noted that the MT and the DU are logical modules. In practice, the MT and the DU may share some sub-modules, for example, may share a transceiver antenna and a baseband processing

[00109] S101: A second node sends first configuration information to a first node, where the first configuration information includes first guard interval information associated with a first timing mode of an MT. The second node is a parent node or a donor node of the first node.

[00110] Accordingly, the first node receives the first configuration information.

[00111] In this embodiment, in a process in which the first node communicates with the second node, resource multiplexing may be performed on an access link and a backhaul link of the first node. As described above, resource multiplexing manners include TDM, SDM, full duplex, and the like. To support the foregoing resource multiplexing manners, the first node and the second node may use corresponding timing modes. In this embodiment, a plurality of timing modes are used. Herein, the first timing mode and a second timing mode are used as examples for description. In actual use, more timing modes may be further included.

[00112] There is a timing ~~mode~~ difference between different timing modes. Therefore, different timing modes may correspond to different quantities of guard symbols, in other words, different timing modes are associated with different guard interval information.

[00113] The second node configures guard interval information associated with different timing modes, to enable the first node and the second node to uniformly obtain the guard interval information associated with the different timing modes, so as to accurately obtain a time domain position of an MT resource and avoid a resource conflict between the backhaul link and the access link. The configuration may be performed based on all, some, or none of guard interval information that is associated with different timing modes and that is reported by the first node. In other words, a quantity of guard symbols that is configured by the second node may be different from an expected quantity of guard symbols that is reported by the first node.

[00114] Specifically, in this step, the second node sends the first configuration information to the first node, where the first configuration information includes the first guard interval information associated with the first timing mode of the MT. The first guard interval information includes a first symbol quantity and a second symbol quantity, where the first symbol quantity indicates a quantity of guard symbols for switching from a DU resource to the MT resource, and the second symbol quantity indicates a quantity of guard symbols for switching from the MT resource to the DU resource.

[00115] S102: The second node sends second configuration information to the first node, where the second configuration information includes second guard interval information associated with

the second timing mode of the MT.

[00116] Accordingly, the first node receives the second configuration information.

[00117] The second node further sends the second configuration information, where the second configuration information may be configuration information different from the first configuration information. The first configuration information and the second configuration information may be MAC CEs or the like. The second configuration information includes the second guard interval information associated with the second timing mode of the MT. The second timing mode is different from the first timing mode.

[00118] Certainly, the second node may further configure guard interval information associated with more timing modes.

[00119] The second guard interval information includes a third symbol quantity and a fourth symbol quantity, where the third symbol quantity indicates a quantity of guard symbols for switching from the DU resource to the MT resource, and the fourth symbol quantity indicates a quantity of guard symbols for switching from the MT resource to the DU resource.

[00120] Value ranges of the first symbol quantity to the fourth symbol quantity may be consistent with those in an existing protocol, in other words, the value ranges are [0,4], and the first symbol quantity to the fourth symbol quantity are all integers. The value ranges of the first symbol quantity to the fourth symbol quantity may alternatively be other ranges. For example, a negative quantity of guard symbols or a larger quantity of guard symbols may be introduced.

[00121] The guard interval information associated with the different timing modes is configured. In this way, when the second node configures the first node to use the different timing modes, the first node and the second node may determine a time domain resource position of the MT based on the obtained guard interval information associated with the different timing modes, a time domain resource position of a DU~~, and the guard interval information~~, to avoid the resource conflict between the access link and the backhaul link, and improve flexibility of the resource multiplexing performed on the access link and the backhaul link.

[00122] Optionally, the second node may configure, in an explicit manner, a timing mode used by the first node, or may configure, in an implicit manner, a timing mode used by the first node.

[00123] For example, the second node sends indication information, where the indication information carries information indicating the timing mode used by the first node. Optionally, the indication information may be carried in downlink control information (downlink control

node. To enable the first node and the second node to uniformly obtain guard interval information of the MT during resource multiplexing, the first node reports, to the second node, guard interval information associated with different timing modes of the MT.

[00134] Specifically, before this step, the first node determines that a start symbol of an MT resource located after a DU resource is located after an end symbol of the DU resource, and the end symbol of the DU resource and the start symbol of the MT resource are separated by N1 symbols, where N1 is a fifth symbol quantity. The first node determines that an end symbol of the MT resource located before the DU resource is located before~~after~~ a start symbol of the DU resource, and the end symbol of the MT resource and the start symbol of the DU resource are separated by M1 symbols, where M1 is a sixth symbol quantity.

[00135] In this step, the first node reports, to the second node, the third guard interval information associated with the first timing mode of the MT, where the third guard interval information includes the fifth symbol quantity and the sixth symbol quantity, the fifth symbol quantity indicates a quantity of guard symbols for switching from the DU resource to the MT resource, and the sixth symbol quantity indicates a quantity of guard symbols for switching from the MT resource to the DU resource.

[00136] For example, when the first node reports, to the second node, the guard interval information associated with the timing mode of the MT, or the second node configures, for the first node, the guard interval information associated with the timing mode, the third guard interval information may be carried in a MAC CE shown in FIG. 14a or FIG. 14b. The MAC CE has six reserved bits (reserved bits), and the timing mode associated with the guard interval information carried in the MAC CE may be indicated by using some of the six bits. The timing mode may be indicated by using any quantity of bits of the six reserved bits, for example, the first two bits of the six reserved bits, the last two bits of the six reserved bits shown in FIG. 14a, or the middle two bits of the six reserved bits shown in FIG. 14b. Certainly, the timing mode may not necessarily be indicated by using two bits. As shown in table 9, guard interval information associated with different timing modes is indicated by using two reserved bits.

Table 9

Bit value	Timing mode
00	Timing mode 1
01	Timing mode 6
10	Timing mode x
11	Timing mode y

[00137] A bit value of "00" indicates the timing mode 1, and a bit value of "01" indicates the timing mode 6. If there are other timing modes, for example, the timing mode x and the timing mode y, different bit values may indicate different timing modes based on a correspondence that is between a bit value and a timing mode and that is shown in table 2. Certainly, the correspondence between a bit value and a timing mode is not limited to that shown in table 2, and there may be another correspondence. For example, the bit value of "00" indicates the timing mode 6, and the bit value of "01" indicates the timing mode 1.

[00138] If there are more timing modes, the guard interval information associated with the different timing modes may be further indicated by using more reserved bits.

[00139] For example, if a value of a reserved bit in the MAC CE is "00", it indicates that a timing mode is the timing mode 1, and eight quantities of guard symbols carried in the MAC CE are the third guard interval information associated with the timing mode 1, namely, $NmbGS_1$ to $NmbGS_8$. After receiving the MAC CE, the second node may learn, based on the value "00" of the reserved bit in the MAC CE, that the eight quantities of guard symbols carried in the MAC CE are the third guard interval information associated with the timing mode 1.

[00140] S202: The first node reports, to the second node, fourth guard interval information associated with the second timing mode of the MT.

[00141] Accordingly, the second node receives the fourth guard interval information associated with the second timing mode of the MT.

[00142] Before this step, the first node determines that the start symbol of the MT resource located after the DU resource is located after the end symbol of the DU resource, and the end symbol of the DU resource and the start symbol of the MT resource are separated by N2 symbols, where N2 is a seventh symbol quantity. The first node determines that the end symbol of the MT resource located before the DU resource is located before~~after~~ the start symbol of the DU resource, and

first node determines the time domain position of the MT resource based on the time domain position of the DU resource and the first guard interval information. Specifically, a specific quantity of guard symbols is determined based on the first guard interval information and a switching scenario. For example, if a DU operation of the first node is switched to an MT operation, it is determined that the start symbol of the MT resource located after the DU resource is located after the end symbol of the DU resource, and the end symbol of the DU resource and the start symbol of the MT resource are separated by the N1 symbols, where N1 is the first symbol quantity. If the MT operation of the first node is switched to the DU operation, it is determined that the end symbol of the MT resource located before the DU resource is located before~~after~~ the start symbol of the DU resource and, the end symbol of the MT resource and the start symbol of the DU resource are separated by the M1 symbols, where M1 is the second symbol quantity.

[00162] After the first node receives the second guard interval information associated with the second timing mode, if the second node configures the first node to use the timing mode 6 currently, the first node determines the time domain position of the MT resource based on the time domain position of the DU resource and the second guard interval information. Specifically, a specific quantity of guard symbols is determined based on the second~~first~~ guard interval information and a switching scenario. For example, if the DU operation of the first node is switched to the MT operation, it is determined that the start symbol of the MT resource located after the DU resource is located after the end symbol of the DU resource, and the end symbol of the DU resource and the start symbol of the MT resource are separated by the N2 symbols, where N2 is the third symbol quantity. If the MT operation of the first node is switched to the DU operation, it is determined that the end symbol of the MT resource located before the DU resource is located before~~after~~ the start symbol of the DU resource and, the end symbol of the MT resource and the start symbol of the DU resource are separated by the M2 symbols, where M2 is the fourth symbol quantity.

[00163] S207: When the second node configures the first node to use a third timing mode, the first node reports, to the second node, fifth guard interval information associated with the third timing mode.

[00164] When the second node configures the first node to use the new third timing mode, if the first node has not reported, to the second node, the fifth guard interval information associated with the third timing mode, the first node may report, to the second node, the fifth guard interval information associated with the third timing mode. Therefore, the second node may configure,

based on all, some, or none of the fifth guard interval information, the guard interval information associated with the third timing mode.

[00165] Value ranges of the first symbol quantity to the eighth symbol quantity may be consistent with those in an existing protocol, in other words, the value ranges are [0,4], and the first symbol quantity to the eighth symbol quantity are all integers. The value ranges of the first symbol quantity to the eighth symbol quantity may alternatively be other ranges. For example, a negative quantity of guard symbols or a larger quantity of guard symbols may be introduced.

[00166] According to the resource multiplexing method provided in this embodiment of this application, the guard interval information configured by the second node is associated with the different timing modes, so that the first node can obtain the guard interval information corresponding to the different timing modes, to improve flexibility of resource multiplexing performed on an access link and a backhaul link.

[00167] FIG. 15 is a schematic flowchart of still another resource multiplexing method according to an embodiment of this application. A procedure is similar to that shown in FIG. 11. Only differences between the embodiment shown in FIG. 15 and the embodiment shown in FIG. 11 are described herein. For other similar parts, refer to text descriptions in FIG. 11. In this embodiment, the first timing mode is a timing mode 1, and the second timing mode is a timing mode 7. To support the foregoing resource multiplexing type 2, namely, simultaneous receiving of the MT and the DU, which is alternatively referred to as receive space division multiplexing (No TDM for MT-RX/DU-RX), the timing mode 7 is introduced in this embodiment. Refer to the schematic diagram of the principles of the timing mode 1 and the timing mode 7 in FIG. 16. When the first node uses the timing mode 7, the first node may implement timing alignment when simultaneously receiving a downlink signal of an MT (MT DL Rx) and an uplink signal of a DU (DU UL Rx) (as shown in schematic diagrams of slots in the first row and the second row in FIG. 16). Specifically, symbol-level alignment (staggering by one symbol) is implemented between the MT DL Rx and the DU UL Rx. In other words, timing alignment is implemented between an uplink receive symbol 1 of the DU and a downlink receive symbol 0 of the MT. Receive timing alignment enables the first node to perform low-complexity joint signal processing of the MT and the DU, and improves receiving performance of the MT and the DU.

[00168] Still refer to schematic diagrams of slots in the first row and the fourth row in FIG. 16. There is a time difference ~~T_p~~ Tp between downlink sending of the DU of the second node and

downlink receiving of the MT of the first node. Refer to schematic diagrams of slots in the third row and the fourth row in FIG. 16. There is a timing difference ~~T_g~~ Tg between an uplink receive frame and a downlink transmit frame of the DU of the second node.

[00169] Therefore, as shown in FIG. 17, there is a timing difference between the timing mode 7 and the timing mode 1, and there is an offset of one TA 1 between an uplink transmit frame and a downlink receive frame of the MT in the timing mode 1. There is the timing difference between the timing mode 7 and the timing mode 1. The timing difference may be a sum of the TA 1 and a first offset value. Alternatively, the timing difference may be a TA 2, and the TA 2 may be different from the TA 1.

[00170] In step S305 shown in FIG. 15, the first offset value or the TA 2 may be configured by the second node. Optionally, alternatively, the first offset value or the TA 2 may be determined by the first node, and reported to the second node.

[00171] In the foregoing embodiment, the described timing mode 1, timing mode 6, and timing mode 7 are all related to uplink timing of the MT. In addition, a timing mode related to downlink timing may be further included. For example, it is assumed that a basic timing mode related to the downlink timing is a timing mode A, and the downlink timing is downlink receive timing determined by an MT of an IAB node based on a synchronization/physical broadcast signal (synchronous signal/physical broadcast channel, SS/PBCH) block or a channel state information-reference signal (channel state information-reference signal, CSI-RS). Currently, a new timing mode B is introduced. The MT of the IAB node may determine downlink receive timing based on a timing difference configured by a parent node or a reference signal. The timing difference is an offset between the timing mode B and the timing mode A. When the MT of the IAB node has a plurality of downlink timing modes, the IAB node may report guard interval information associated with different downlink timing modes, and the parent node may configure the guard interval information associated with the different downlink timing modes. For a process of the reporting and configuration, refer to related descriptions in the embodiment of an uplink timing mode.

[00172] In the foregoing embodiments, guard interval information is grouped based on different associated timing modes. In the following embodiment, another guard symbol grouping manner is considered.

[00173] FIG. 18 is a schematic flowchart of yet another resource multiplexing method

CLAIMS

What is claimed is:

1. A resource multiplexing method, wherein the method comprises:

receiving, by a first node, first configuration information sent by a second node, wherein the first configuration information comprises first guard interval information associated with a first timing mode of a mobile termination MT, the first guard interval information comprises a first symbol quantity and a second symbol quantity, the first symbol quantity indicates a quantity of guard symbols for switching from a distributed unit DU resource to an MT resource, the second symbol quantity indicates a quantity of guard symbols for switching from the MT resource to the DU resource, and the second~~first~~ node is a parent node or a donor node of the ~~second~~ first node; and

receiving, by the first node, second configuration information sent by the second node, wherein the second configuration information comprises second guard interval information associated with a second timing mode of the MT, the second guard interval information comprises a third symbol quantity and a fourth symbol quantity, the third symbol quantity indicates a quantity of guard symbols for switching from the DU resource to the MT resource, and the fourth symbol quantity indicates a quantity of guard symbols for switching from the MT resource to the DU resource.

2. The method according to claim 1, wherein the method further comprises:

when a timing mode of the first node is the first timing mode, determining a time domain position of the MT resource based on a time domain position of the DU resource and the first guard interval information; or

when a timing mode of the first node is the second timing mode, determining a time domain position of the MT resource based on a time domain position of the DU resource and the second guard interval information.

3. The method according to claim 1 or 2, wherein the method further comprises:

reporting, by the first node to the second node, third guard interval information associated with the first timing mode of the MT, wherein the third guard interval information comprises a fifth symbol quantity and a sixth symbol quantity, the fifth symbol quantity indicates a quantity of guard symbols for switching from the DU resource to the MT resource, and the sixth symbol

quantity indicates a quantity of guard symbols for switching from the MT resource to the DU resource; and

reporting, by the first node to the second node, fourth guard interval information associated with the second timing mode of the MT, wherein the fourth guard interval information comprises a seventh symbol quantity and an eighth symbol quantity, the seventh symbol quantity indicates a quantity of guard symbols for switching from the DU resource to the MT resource, and the eighth symbol quantity indicates a quantity of guard symbols for switching from the MT resource to the DU resource.

4. The method according to any one of claims 1 to 3, wherein when a timing mode of the first node is the second timing mode, and the second timing mode is timing mode 6, the MT uplink sending of the first node is aligned with DU downlink sending of the first node in time domain.

5. The method according to any one of claims 1 to 4, wherein when a timing mode of the first node is the second timing mode, and the second timing mode is timing mode 6, the following switching scenarios are included: MT uplink transmission to DU downlink transmission (MT UL Tx to DU DL Tx), MT uplink transmission to DU uplink receiving (MT UL Tx to DU UL Rx), DU downlink transmission to MT uplink transmission (DU DL Tx to MT UL Tx) and DU uplink transmission to MT uplink transmission (DU UL Rx to MT UL Tx).

~~4. The method according to any one of claims 1 to 3, wherein~~

~~a value range of the first symbol quantity is [−3,4];~~

~~a value range of the second symbol quantity is [−3,4];~~

~~a value range of the third symbol quantity is [−3,4]; and~~

~~a value range of the fourth symbol quantity is [−3,4], wherein~~

~~the first symbol quantity, the second symbol quantity, the third symbol quantity, and the fourth symbol quantity are integers.~~

~~5. The method according to claim 3 or 4, wherein~~

~~a value range of the fifth symbol quantity is [−3,4];~~

~~a value range of the sixth symbol quantity is [−3,4];~~

~~a value range of the seventh symbol quantity is [−3,4]; and~~

~~a value range of the eighth symbol quantity is [−3,4], wherein~~

~~the fifth symbol quantity, the sixth symbol quantity, the seventh symbol quantity, and the eighth symbol quantity are integers.~~

6. The method according to any one of claims 1 to 5, wherein

the first timing mode is a timing mode 1, and the second timing mode is a timing mode 6;

the first timing mode is a timing mode 1, and the second timing mode is a timing mode 7; or

the first timing mode is a timing mode 6, and the second timing mode is a timing mode 7.

~~7. The method according to any one of claims 1 to 6, wherein the method further comprises:~~

~~reporting, by the first node, a timing difference between the first timing mode and the second timing mode to the second node.~~

~~8~~7. The method according to any one of claims 1 to 6, wherein the method further comprises:

receiving, by the first node, a timing difference that is between the first timing mode and the second timing mode and that is configured by the second node.

~~9~~8. The method according to any one of claims 1 to ~~8~~7, wherein the method further comprises:

when the second node configures the first node to use a third timing mode, reporting, by the first node to the second node, fifth guard interval information associated with the third timing mode.

~~10. The method according to any one of claims 1 to 9, wherein~~

~~the first symbol quantity comprises a quantity of symbols by which a DU downlink symbol and an MT downlink symbol are separated, a quantity of symbols by which the DU downlink symbol and an MT uplink symbol are separated, a quantity of symbols by which a DU uplink symbol and the MT uplink symbol are separated, and a quantity of symbols by which the DU uplink symbol and the MT downlink symbol are separated; and~~

~~the second symbol quantity comprises a quantity of symbols by which the MT downlink symbol and the DU downlink symbol are separated, a quantity of symbols by which the MT downlink symbol and the DU uplink symbol are separated, a quantity of symbols by which the MT uplink symbol and the DU uplink symbol are separated, and a quantity of symbols by which the MT uplink symbol and the DU downlink symbol are separated.~~

~~11. The method according to any one of claims 1 to 10, wherein the determining a time domain position of the MT resource based on a time domain position of the DU resource and the first guard interval information specifically comprises:~~

~~determining, by the first node, that a start symbol of the MT resource located after the DU resource is:~~

~~located after an end symbol of the DU resource, and the end symbol of the DU resource and~~

~~the start symbol of the MT resource are separated by N symbols, wherein N is the first symbol quantity; and~~

~~determining, by the first node, that an end symbol of the MT resource located before the DU resource is:~~

~~located before a start symbol of the DU resource, and the end symbol of the MT resource and the start symbol of the DU resource are separated by M symbols, wherein M is the second symbol quantity.~~

~~12~~9. A resource multiplexing method, wherein the method comprises:

sending, by a second node, first configuration information to a first node, wherein the first configuration information comprises first guard interval information associated with a first timing mode of a mobile termination MT, the first guard interval information comprises a first symbol quantity and a second symbol quantity, the first symbol quantity indicates a quantity of guard symbols for switching from a distributed unit DU resource to an MT resource, the second symbol quantity indicates a quantity of guard symbols for switching from the MT resource to the DU resource, and the second~~first~~ node is a parent node or a donor node of the ~~second~~ first node; and

sending, by the second node, second configuration information to the first node, wherein the second configuration information comprises second guard interval information associated with a second timing mode of the MT, the second guard interval information comprises a third symbol quantity and a fourth symbol quantity, the third symbol quantity indicates a quantity of guard symbols for switching from the DU resource to the MT resource, and the fourth symbol quantity indicates a quantity of guard symbols for switching from the MT resource to the DU resource.

~~13~~10. The method according to claim ~~12~~9, wherein the method further comprises:

receiving, by the second node, third guard interval information that is associated with the first timing mode of the MT and that is reported by the first node, wherein the third guard interval information comprises a fifth symbol quantity and a sixth symbol quantity, the fifth symbol quantity indicates a quantity of guard symbols for switching from the DU resource to the MT resource, and the sixth symbol quantity indicates a quantity of guard symbols for switching from the MT resource to the DU resource; and

receiving, by the second node, fourth guard interval information that is associated with the second timing mode of the MT and that is reported by the first node, wherein the fourth guard interval information comprises a seventh symbol quantity and an eighth symbol quantity, the

seventh symbol quantity indicates a quantity of guard symbols for switching from the DU resource to the MT resource, and the eighth symbol quantity indicates a quantity of guard symbols for switching from the MT resource to the DU resource.

11. The method according to claim 9 or 10, wherein when a timing mode of the first node is the second timing mode, and the second timing mode is timing mode 6, the MT uplink sending of the first node is aligned with DU downlink sending of the first node in time domain.

12. The method according to any one of claims 9 to 11, wherein when a timing mode of the first node is the second timing mode, and the second timing mode is timing mode 6, the following switching scenarios are included: MT uplink transmission to DU downlink transmission (MT UL Tx to DU DL Tx), MT uplink transmission to DU uplink receiving (MT UL Tx to DU UL Rx), DU downlink transmission to MT uplink transmission (DU DL Tx to MT UL Tx) and DU uplink transmission to MT uplink transmission (DU UL Rx to MT UL Tx).

~~14. The method according to claim 12 or 13, wherein a value range of the first symbol quantity is [-3,4];~~

~~a value range of the second symbol quantity is [-3,4];~~

~~a value range of the third symbol quantity is [-3,4]; and~~

~~a value range of the fourth symbol quantity is [-3,4], wherein~~

~~the first symbol quantity, the second symbol quantity, the third symbol quantity, and the fourth symbol quantity are integers.~~

~~15. The method according to claim 13, wherein a value range of the fifth symbol quantity is [-3,4];~~

~~a value range of the sixth symbol quantity is [-3,4];~~

~~a value range of the seventh symbol quantity is [-3,4]; and~~

~~a value range of the eighth symbol quantity is [-3,4], wherein~~

~~the fifth symbol quantity, the sixth symbol quantity, the seventh symbol quantity, and the eighth symbol quantity are integers.~~

~~16~~13. The method according to any one of claims ~~12~~ 9 to ~~15~~12, wherein

the first timing mode is a timing mode 1, and the second timing mode is a timing mode 6; or

the first timing mode is a timing mode 1, and the second timing mode is a timing mode 7; or

the first timing mode is a timing mode 6, and the second timing mode is a timing mode 7.

~~17. The method according to any one of claims 12 to 16, wherein the method further~~

~~comprises:~~

~~receiving, by the second node, a timing difference that is between the first timing mode and the second timing mode and that is reported by the first node.~~

~~18~~14. The method according to any one of claims ~~12~~ 9 to ~~16~~13, wherein the method further comprises:

sending, by the second node, a configured timing difference between the first timing mode and the second timing mode to the first node.

~~19~~15. The method according to any one of claims ~~12~~ 9 to ~~18~~14, wherein the method further comprises:

when the second node configures the first node to use a third timing mode, receiving, by the second node, fifth guard interval information that is associated with the third timing mode and that is reported by the first node.

~~20. A resource multiplexing method, wherein the method comprises:~~

~~determining, by a first node, a type of a start symbol or an end symbol of a distributed unit DU resource, wherein an end symbol of a mobile termination MT resource is located before the start symbol of the DU resource, or a start symbol of an MT resource is located after the end symbol of the DU resource;~~

~~obtaining, by the first node, a guard symbol quantity group associated with the type of the start symbol or the end symbol of the DU resource, wherein the guard symbol quantity group comprises a first symbol quantity and a second symbol quantity, the first symbol quantity indicates a quantity of guard symbols for switching from the DU resource to the MT resource, and the second symbol quantity indicates a quantity of guard symbols for switching from the MT resource to the DU resource; and~~

~~determining, by the first node, a time domain position of the MT resource based on a time domain position of the DU resource and the guard symbol quantity group associated with the type of the start symbol or the end symbol of the DU resource.~~

~~21. The method according to claim 20, wherein the end symbol of the DU resource comprises the following types:~~

~~a symbol on a boundary of a DU hard resource, a symbol on a boundary of a DU soft resource indicated as available, a symbol on a boundary of a resource that is occupied by a special signal or channel and converted into a DU hard resource, a symbol on a boundary of a DU slot, a symbol in~~

~~a DU slot, a symbol at a start position of a DU downlink slot, a symbol at an end position of a DU downlink slot, a symbol at a start position of a DU uplink slot, and a symbol at an end position of a DU uplink slot.~~

~~22. The method according to claim 20 or 21, wherein the start symbol of the DU resource comprises the following types:~~

~~a symbol on a boundary of a DU hard resource, a symbol on a boundary of a DU soft resource indicated as available, a symbol on a boundary of a resource that is occupied by a special signal or channel and converted into a DU hard resource, a symbol on a boundary of a DU slot, a symbol in a DU slot, a symbol at a start position of a DU downlink slot, a symbol at an end position of a DU downlink slot, a symbol at a start position of a DU uplink slot, and a symbol at an end position of a DU uplink slot.~~

~~23. The method according to any one of claims 20 to 22, wherein the guard symbol quantity group comprises one or more of the following groups:~~

~~a guard symbol quantity group reported by the first node and a guard symbol quantity group configured by the second node; or~~

~~a guard symbol quantity group configured by the second node and a preset guard symbol quantity group.~~

~~24~~16. A resource multiplexing apparatus, wherein the apparatus comprises:

a transceiver unit, configured to: receive first configuration information sent by a second node, wherein the first configuration information comprises first guard interval information associated with a first timing mode of a mobile termination MT, the first guard interval information comprises a first symbol quantity and a second symbol quantity, the first symbol quantity indicates a quantity of guard symbols for switching from a distributed unit DU resource to an MT resource, the second symbol quantity indicates a quantity of guard symbols for switching from the MT resource to the DU resource, and a second~~first~~ node is a parent node or a donor node of the ~~second~~ resource multiplexing apparatus ~~node~~; and

receive second configuration information sent by the second node, wherein the second configuration information comprises second guard interval information associated with a second timing mode of the MT, the second guard interval information comprises a third symbol quantity and a fourth symbol quantity, the third symbol quantity indicates a quantity of guard symbols for switching from the DU resource to the MT resource, and the fourth symbol quantity indicates a

quantity of guard symbols for switching from the MT resource to the DU resource.

~~25~~17. The apparatus according to claim ~~24~~16, wherein the apparatus further comprises:

a processing unit, configured to: when a timing mode of the first node is the first timing mode, determine a time domain position of the MT resource based on a time domain position of the DU resource and the first guard interval information; or

when a timing mode of the first node is the second timing mode, determine a time domain position of the MT resource based on a time domain position of the DU resource and the second guard interval information.

~~26~~18. The apparatus according to claim ~~24 or 25~~16 or 17, wherein

the transceiver unit is further configured to report, to the second node, third guard interval information associated with the first timing mode of the MT, wherein the third guard interval information comprises a fifth symbol quantity and a sixth symbol quantity, the fifth symbol quantity indicates a quantity of guard symbols for switching from the DU resource to the MT resource, and the sixth symbol quantity indicates a quantity of guard symbols for switching from the MT resource to the DU resource; and

the transceiver unit is further configured to report, to the second node, fourth guard interval information associated with the second timing mode of the MT, wherein the fourth guard interval information comprises a seventh symbol quantity and an eighth symbol quantity, the seventh symbol quantity indicates a quantity of guard symbols for switching from the DU resource to the MT resource, and the eighth symbol quantity indicates a quantity of guard symbols for switching from the MT resource to the DU resource.

19. The apparatus according to any one of claims 16 to 18, wherein when a timing mode of the apparatus is the second timing mode, and the second timing mode is timing mode 6, the MT uplink sending of the first node is aligned with DU downlink sending of the apparatus in time domain.

20. The apparatus according to any one of claims 16 to 19, wherein when a timing mode of the apparatus is the second timing mode, and the second timing mode is timing mode 6, the following switching scenarios are included: MT uplink transmission to DU downlink transmission (MT UL Tx to DU DL Tx), MT uplink transmission to DU uplink receiving (MT UL Tx to DU UL Rx), DU downlink transmission to MT uplink transmission (DU DL Tx to MT UL Tx) and DU uplink transmission to MT uplink transmission (DU UL Rx to MT UL Tx).

~~27. The apparatus according to any one of claims 24 to 26, wherein a value range of the first symbol quantity is [~~ ~~3,4];~~

~~a value range of the second symbol quantity is [~~ ~~3,4];~~

~~a value range of the third symbol quantity is [~~ ~~3,4]; and~~

~~a value range of the fourth symbol quantity is [~~ ~~3,4], wherein~~

~~the first symbol quantity, the second symbol quantity, the third symbol quantity, and the fourth symbol quantity are integers.~~

~~28. The apparatus according to claim 26 or 27, wherein a value range of the fifth symbol quantity is [~~ ~~3,4];~~

~~a value range of the sixth symbol quantity is [~~ ~~3,4];~~

~~a value range of the seventh symbol quantity is [~~ ~~3,4]; and~~

~~a value range of the eighth symbol quantity is [~~ ~~3,4], wherein~~

~~the fifth symbol quantity, the sixth symbol quantity, the seventh symbol quantity, and the eighth symbol quantity are integers.~~

~~29~~21. The apparatus according to any one of claims ~~24~~ 19 to ~~28~~20, wherein

the first timing mode is a timing mode 1, and the second timing mode is a timing mode 6; or

the first timing mode is a timing mode 1, and the second timing mode is a timing mode 7; or

the first timing mode is a timing mode 6, and the second timing mode is a timing mode 7.

~~30. The apparatus according to any one of claims 24 to 29, wherein~~

~~the transceiver unit is further configured to report a timing difference between the first timing mode and the second timing mode to the second node.~~

~~31~~22. The apparatus according to any one of claims ~~24~~ 19 to ~~30~~21, wherein

the transceiver unit is further configured to receive a timing difference that is between the first timing mode and the second timing mode and that is configured by the second node.

~~32~~23. The apparatus according to any one of claims ~~24~~ 19 to ~~31~~22, wherein

the transceiver unit is further configured to: when the second node configures the apparatus~~first node~~ to use a third timing mode, report, to the second node, fifth guard interval information associated with the third timing mode.

~~33~~24. The apparatus according to any one of claims ~~24~~ 19 to ~~32~~23, wherein

the first symbol quantity comprises a quantity of symbols by which a DU downlink symbol

and an MT downlink symbol are separated, a quantity of symbols by which the DU downlink symbol and an MT uplink symbol are separated, a quantity of symbols by which a DU uplink symbol and the MT uplink symbol are separated, and a quantity of symbols by which the DU uplink symbol and the MT downlink symbol are separated; and

the second symbol quantity comprises a quantity of symbols by which the MT downlink symbol and the DU downlink symbol are separated, a quantity of symbols by which the MT downlink symbol and the DU uplink symbol are separated, a quantity of symbols by which the MT uplink symbol and the DU uplink symbol are separated, and a quantity of symbols by which the MT uplink symbol and the DU downlink symbol are separated.

~~34. The apparatus according to any one of claims 24 to 33, wherein~~

~~the processing unit is further configured to determine that a start symbol of the MT resource located after the DU resource is located after an end symbol of the DU resource, and the end symbol of the DU resource and the start symbol of the MT resource are separated by N symbols, wherein N is the first symbol quantity; and~~

~~the processing unit is further configured to determine that an end symbol of the MT resource located before the DU resource is located before a start symbol of the DU resource, and the end symbol of the MT resource and the start symbol of the DU resource are separated by M symbols, wherein M is the second symbol quantity.~~

~~35~~25. A resource multiplexing apparatus, wherein the apparatus comprises:

a transceiver unit, configured to: send first configuration information to a first node, wherein the first configuration information comprises first guard interval information associated with a first timing mode of a mobile termination MT, the first guard interval information comprises a first symbol quantity and a second symbol quantity, the first symbol quantity indicates a quantity of guard symbols for switching from a distributed unit DU resource to an MT resource, the second symbol quantity indicates a quantity of guard symbols for switching from the MT resource to the DU resource, and the resource multiplexing apparatus ~~first node~~ is a parent node or a donor node of ~~a~~the first~~second~~ node; and

send second configuration information to the first node, wherein the second configuration information comprises second guard interval information associated with a second timing mode of the MT, the second guard interval information comprises a third symbol quantity and a fourth symbol quantity, the third symbol quantity indicates a quantity of guard symbols for switching

from the DU resource to the MT resource, and the fourth symbol quantity indicates a quantity of guard symbols for switching from the MT resource to the DU resource.

~~36~~26. The apparatus according to claim ~~35~~25, wherein

the transceiver unit is further configured to receive third guard interval information that is associated with the first timing mode of the MT and that is reported by the first node, wherein the third guard interval information comprises a fifth symbol quantity and a sixth symbol quantity, the fifth symbol quantity indicates a quantity of guard symbols for switching from the DU resource to the MT resource, and the sixth symbol quantity indicates a quantity of guard symbols for switching from the MT resource to the DU resource; and

the transceiver unit is further configured to receive fourth guard interval information that is associated with the second timing mode of the MT and that is reported by the first node, wherein the fourth guard interval information comprises a seventh symbol quantity and an eighth symbol quantity, the seventh symbol quantity indicates a quantity of guard symbols for switching from the DU resource to the MT resource, and the eighth symbol quantity indicates a quantity of guard symbols for switching from the MT resource to the DU resource.

27. The apparatus according to claim 25 or 26, wherein when a timing mode of the first node is the second timing mode, and the second timing mode is timing mode 6, the MT uplink sending of the first node is aligned with DU downlink sending of the first node in time domain.

28. The apparatus according to claim 25 or 26, wherein when a timing mode of the first node is the second timing mode, and the second timing mode is timing mode 6, the following switching scenarios are included: MT uplink transmission to DU downlink transmission (MT UL Tx to DU DL Tx), MT uplink transmission to DU uplink receiving (MT UL Tx to DU UL Rx), DU downlink transmission to MT uplink transmission (DU DL Tx to MT UL Tx) and DU uplink transmission to MT uplink transmission (DU UL Rx to MT UL Tx).

~~37. The apparatus according to claim 35 or 36, wherein a value range of the first symbol quantity is [-3,4];~~

~~a value range of the second symbol quantity is [-3,4];~~

~~a value range of the third symbol quantity is [-3,4]; and~~

~~a value range of the fourth symbol quantity is [-3,4], wherein~~

~~the first symbol quantity, the second symbol quantity, the third symbol quantity, and the fourth symbol quantity are integers.~~

~~38. The apparatus according to claim 36, wherein a value range of the fifth symbol quantity is [~~ ~~3,4];~~

~~a value range of the sixth symbol quantity is [~~ ~~3,4];~~

~~a value range of the seventh symbol quantity is [~~ ~~3,4]; and~~

~~a value range of the eighth symbol quantity is [~~ ~~3,4], wherein~~

~~the fifth symbol quantity, the sixth symbol quantity, the seventh symbol quantity, and the eighth symbol quantity are integers.~~

~~39~~29. The apparatus according to any one of claims ~~35~~ 25 to ~~38~~28, wherein

the first timing mode is a timing mode 1, and the second timing mode is a timing mode 6; or

the first timing mode is a timing mode 1, and the second timing mode is a timing mode 7; or

the first timing mode is a timing mode 6, and the second timing mode is a timing mode 7.

~~40. The apparatus according to any one of claims 35 to 39, wherein~~

~~the transceiver unit is further configured to receive a timing difference that is between the first timing mode and the second timing mode and that is reported by the first node.~~

~~41~~30. The apparatus according to any one of claims ~~35~~ 25 to ~~40~~29, wherein the apparatus further comprises:

the transceiver unit is further configured to send a configured timing difference between the first timing mode and the second timing mode to the first node.

~~42~~31. The apparatus according to any one of claims ~~35~~ 25 to ~~41~~30, wherein

the transceiver unit is further configured to: when the apparatus~~second node~~ configures the first node to use a third timing mode, receive fifth guard interval information that is associated with the third timing mode and that is reported by the first node.

~~43. A resource multiplexing apparatus, wherein the apparatus comprises:~~

~~a processing unit, configured to: determine a type of a start symbol or an end symbol of a distributed unit DU resource, wherein an end symbol of a mobile termination MT resource is located before the start symbol of the DU resource, or a start symbol of an MT resource is located after the end symbol of the DU resource;~~

~~obtain a guard symbol quantity group associated with the type of the start symbol or the end symbol of the DU resource, wherein the guard symbol quantity group comprises a first symbol quantity and a second symbol quantity, the first symbol quantity indicates a quantity of guard symbols for switching from the DU resource to the MT resource, and the second symbol quantity~~

~~indicates a quantity of guard symbols for switching from the MT resource to the DU resource; and~~

~~determine, for the first node, a time domain position of the MT resource based on a time domain position of the DU resource and the guard symbol quantity group associated with the type of the start symbol or the end symbol of the DU resource.~~

~~44. The apparatus according to claim 43, wherein the end symbol of the DU resource comprises the following types:~~

~~a symbol on a boundary of a DU hard resource, a symbol on a boundary of a DU soft resource indicated as available, a symbol on a boundary of a resource that is occupied by a special signal or channel and converted into a DU hard resource, a symbol on a boundary of a DU slot, a symbol in a DU slot, a symbol at a start position of a DU downlink slot, a symbol at an end position of a DU downlink slot, a symbol at a start position of a DU uplink slot, and a symbol at an end position of a DU uplink slot.~~

~~45. The apparatus according to claim 43 or 44, wherein the start symbol of the DU resource comprises the following types:~~

~~a symbol on a boundary of a DU hard resource, a symbol on a boundary of a DU soft resource indicated as available, a symbol on a boundary of a resource that is occupied by a special signal or channel and converted into a DU hard resource, a symbol on a boundary of a DU slot, a symbol in a DU slot, a symbol at a start position of a DU downlink slot, a symbol at an end position of a DU downlink slot, a symbol at a start position of a DU uplink slot, and a symbol at an end position of a DU uplink slot.~~

~~46. The apparatus according to any one of claims 43 to 45, wherein the guard symbol quantity group comprises one or more of the following groups:~~

~~a guard symbol quantity group reported by the first node and a guard symbol quantity group configured by the second node; or~~

~~a guard symbol quantity group configured by the second node and a preset guard symbol quantity group.~~

~~47~~32. A resource multiplexing apparatus, comprising a processor, wherein the processor is coupled to a memory, and is configured to: read instructions in the memory, and implement the method according to any one of claims 1 to ~~11~~ 8 or any one of claims 9 to 15 according to the instructions.

~~48. A resource multiplexing apparatus, comprising a processor, wherein the processor is~~

~~coupled to a memory, and is configured to: read instructions in the memory, and implement the method according to any one of claims 12 to 19 according to the instructions.~~

~~49. A resource multiplexing apparatus, comprising a processor, wherein the processor is coupled to a memory, and is configured to: read instructions in the memory, and implement the method according to any one of claims 20 to 23 according to the instructions.~~

~~50~~33. A computer-readable storage medium, wherein the computer-readable storage medium stores a computer program; and when the program is executed by a processor, the method according to any one of claims 1 to ~~23~~ 8 or any one of claims 9 to 15 is implemented.

~~51. A computer program product, wherein when the computer program product is executed on a computer, the method according to any one of claims 1 to 23 is implemented.~~