(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
22 August 2024 (22.08.2024)

WIPO | PCT

(10) International Publication Number
WO 2024/168488 A1

(51) International Patent Classification:
H04W 24/02 (2009.01)

(21) International Application Number:
PCT/CN2023/075756

(22) International Filing Date:
13 February 2023 (13.02.2023)

(25) Filing Language: English

(26) Publication Language: English

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

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

Published:
— *with international search report (Art. 21(3))*

(54) **Title:** DEVICE, METHOD AND COMPUTER READABLE MEDIUM FOR COMMUNICATIONS

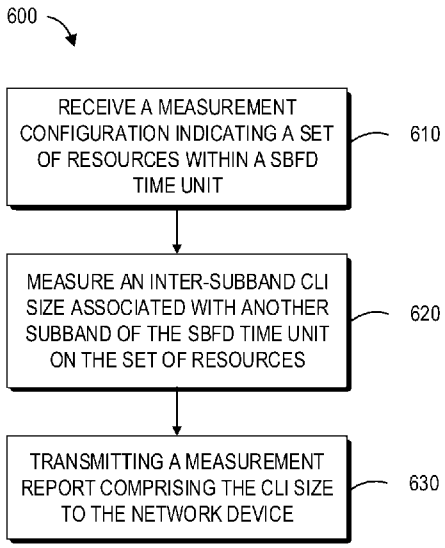


FIG. 6

(57) **Abstract:** Embodiments of the present disclosure relate to devices, methods and computer readable medium for cross link interference (CLI) management. According to embodiments of the present disclosure, a first terminal device receives a measurement configuration from a network device. The measurement configuration indicates a set of resources within a subband of a SBFD time unit that comprises subbands not overlapped with each other. The first terminal device measures, on the set of resources, an inter-subband CLI size associated with another subband of the SBFD time unit. The other subband has a link direction different from the subband. The first terminal device transmits a measurement report comprising the CLI size to the network device, In this way, the CLI effect can be managed.

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DEVICE, METHOD AND COMPUTER READABLE MEDIUM FOR COMMUNICATIONS

FIELD

[0001] Embodiments of the present disclosure generally relate to the field of communication, and in particular, to devices, methods and computer readable medium for cross link interference management (CLIM).

BACKGROUND

[0002] With the development of communication technology, a time unit (for example, a symbol, slot, frame, sub-frame and so on) can be divided into a plurality of frequency subbands in the frequency domain. The plurality of frequency subbands does not overlap with each other and may be individually used for different link directions, for example, uplink (UL) or downlink (DL) direction. This time unit may be also referred to as the subband non-overlapping full duplex (SBFD) time unit. In turn, a device for communication (for example, a network device or a terminal device) may perform the simultaneous transmission and reception of channels in different link directions on these time units, in order to improve communication efficiency.

[0003] In addition, a SBFD time unit may be not alignment with another SBFD time unit, such as the SBFD time unit and the other SBFD time unit being configured for different network devices. In this case, a UL frequency subband of the SBFD time unit may partially overlap with a DL frequency subband of the other SBFD time unit. In turn, the signals transmitted in the UL frequency subband and the overlapped DL frequency subband may interfere with each other. This may be referred to as the intra-subband cross link interference (CLI). Furthermore, the signals transmitted on different frequency subbands (for example, UL frequency subband and DL frequency subband) of the same divided SBFD time unit may also interfere with each other. This may be also referred to as the inter-subband CLI.

SUMMARY

[0004] In general, example embodiments of the present disclosure relate to devices, methods, and computer readable medium for cross link interference (CLI) management.

[0005] In a first aspect, there is provided a first terminal device. The first terminal device comprises a transceiver and a processor communicatively coupled to the transceiver. The processor is configured to cause the first terminal device to receive a measurement configuration from a network device. The measurement configuration indicates a set of resources within a subband of a SBFD time unit. The SBFD time unit comprises subbands not overlapped with each other. The first terminal device is further caused to measure, on the set of resources, an inter-subband CLI size associated with another subband of the SBFD time unit. The other subband has a link direction different from the subband. The first terminal device is further caused to transmit a measurement report comprising the CLI size to the network device.

[0006] In a second aspect, there is provided a network device. The network device comprises a transceiver and a processor communicatively coupled to the transceiver. The processor is configured to cause the network device to transmit a measurement configuration to at least one of a first terminal device and a second terminal device. The measurement configuration indicates a set of resources within a subband of a SBFD time unit that comprises subbands not overlapped with each other. The network device is further caused to receive a measurement report comprising an inter-subband CLI size in the subband from the first terminal device.

[0007] In a third aspect, there is provided a second terminal device. The second terminal device comprises a transceiver and a processor communicatively coupled to the transceiver. The processor is configured to cause the second terminal device to receive a measurement configuration from a network device. The measurement configuration indicates a set of resources within a subband of a SBFD time unit that comprises subbands not overlapped with each other. The second terminal device is further caused to transmit an inter-subband CLI-RS on another subband of the SBFD time unit to a first terminal device. The other subband has a link direction different from the subband.

[0008] In a fourth aspect, there is provided a first network device. The first network device comprises a transceiver and a processor communicatively coupled to the transceiver. The processor is configured to cause the first network device to obtain a measurement configuration indicating a set of resources within a subband of a SBFD time unit. The SBFD comprises subbands not overlapped with each other. The first network device is further caused to measure, on the set of resources, an inter-subband CLI size associated with another subband of the SBFD time unit. The other subband has a link direction

different from the subband.

[0009] In a fifth aspect, there is provided a second network device. The second network device comprises a transceiver and a processor communicatively coupled to the transceiver. The processor is configured to cause the second network device to obtain a measurement configuration indicating a set of resources within a subband of a SBFD time unit. The SBFD comprises subbands not overlapped with each other. The second network device is further caused to transmit an inter-subband CLI-RS on another subband of the SBFD time unit to a first network device. The other subband has a link direction different from the subband.

[0010] In a sixth aspect, there is provided a method implemented at a first terminal device. In the method, the first terminal device receives a measurement configuration from a network device. The measurement configuration indicates a set of resources within a subband of a SBFD time unit that comprises subbands not overlapped with each other. The first terminal device measures, on the set of resources, an inter-subband cross link interference (CLI) size associated with another subband of the SBFD time unit. The other subband has a link direction different from the subband. The first terminal device transmits a measurement report comprising the CLI size to the network device.

[0011] In a seventh aspect, there is provided a method implemented at a network device. In the method, the network device transmits, to at least one of a first terminal device and a second terminal device, a measurement configuration indicating a set of resources within a subband of a SBFD time unit that comprises subbands not overlapped with each other. The network device receives, from the first terminal device, a measurement report comprising an inter-subband CLI size in the subband. The CLI size is associated with another subband of the SBFD time unit. The other subband has a link direction different from the subband.

[0012] In an eighth aspect, there is provided a method implemented at a second terminal device. In the method, the second terminal device receives, from a network device, a measurement configuration indicating a set of resources within a subband of a SBFD time unit. The SBFD time unit comprises subbands not overlapped with each other. The second terminal device transmits, to a first terminal device, an inter-subband cross link interference-reference signal (CLI-RS) on another subband of the SBFD time unit. The other subband has a link direction different from the subband.

[0013] In a ninth aspect, there is provided a method implemented at a first network device. In the method, the first network device obtains a measurement configuration indicating a set of resources within a subband of a SBFD time unit. The SBFD time unit comprises subbands not overlapped with each other. The first network device measures, on the set of resources, an inter-subband cross link interference (CLI) size associated with another subband of the SBFD time unit. The other subband has a link direction different from the subband.

[0014] In a tenth aspect, there is provided a method implemented at a second network device. In the method, the second network device obtains a measurement configuration indicating a set of resources within a subband of a SBFD time unit. The SBFD time unit comprises subbands not overlapped with each other.

[0015] In an eleventh aspect, there is provided a computer readable medium having instructions stored thereon, the instructions, when executed on at least one processor, causing the at least one processor to perform the method of any of the sixth aspect to the tenth aspect.

[0016] It is to be understood that the summary section is not intended to identify key or essential features of example embodiments of the present disclosure, nor is it intended to be used to limit the scope of the present disclosure. Other features of the present disclosure will become easily comprehensible through the following description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] Some example embodiments will now be described with reference to the accompanying drawings, where:

[0018] Fig. 1a illustrates an example environment in which some embodiments of the present disclosure can be implemented;

[0019] Fig. 1b illustrates an example of inter-subband CLI that is caused by a neighboring subband;

[0020] Fig. 2 illustrates a signaling process for managing inter-subband CLI between terminal devices in the SBFD time units according to some embodiments of the present disclosure;

[0021] Figs. 3a to 3b illustrate examples of e measurement resource configurations

according to some embodiments of the present disclosure;

[0022] Fig. 4a illustrates an example of a channel state information-reference signal (CSI-RS) configuration for reducing the inter-subband CLI effect according to some embodiments of the present disclosure;

[0023] Fig. 4b illustrates an example of a modulation and coding scheme (MCS) configuration for reducing the inter-subband CLI effect according to some embodiments of the present disclosure;

[0024] Fig. 4c illustrates an example of a power configuration for reducing the inter-subband CLI effect according to some embodiments of the present disclosure;

[0025] Fig. 4d illustrates an example of a demodulation reference signal (DMRS) configuration for reducing the inter-subband CLI effect according to some embodiments of the present disclosure;

[0026] Fig. 5 illustrates a signaling process for managing inter-subband CLI between network devices in the SBFD time units according to some embodiments of the present disclosure;

[0027] Fig. 6 illustrates a flowchart of an example method implemented at a first terminal device according to some embodiments of the present disclosure;

[0028] Fig. 7 illustrates a flowchart of an example method implemented at a network device according to some embodiments of the present disclosure;

[0029] Fig. 8 illustrates a flowchart of an example method implemented at a second terminal device according to some embodiments of the present disclosure;

[0030] Fig. 9 illustrates a flowchart of an example method implemented at a first network device according to some embodiments of the present disclosure;

[0031] Fig. 10 illustrates a flowchart of an example method implemented at a second network device according to some embodiments of the present disclosure; and

[0032] Fig. 11 illustrates a simplified block diagram of a device that is suitable for implementing example embodiments of the present disclosure.

[0033] Throughout the drawings, the same or similar reference numerals represent the same or similar element.

DETAILED DESCRIPTION

[0034] Principle of the present disclosure will now be described with reference to some embodiments. It is to be understood that these embodiments are described only for the purpose of illustration and help those skilled in the art to understand and implement the present disclosure, without suggesting any limitations as to the scope of the disclosure. The disclosure described herein can be implemented in various manners other than the ones described below.

[0035] In the following description and claims, unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skills in the art to which this disclosure belongs.

[0036] As used herein, the term 'terminal device' refers to any device having wireless or wired communication capabilities. Examples of the terminal device include, but not limited to, user equipment (UE), personal computers, desktops, mobile phones, cellular phones, smart phones, personal digital assistants (PDAs), portable computers, tablets, wearable devices, internet of things (IoT) devices, Ultra-reliable and Low Latency Communications (URLLC) devices, Internet of Everything (IoE) devices, machine type communication (MTC) devices, device on vehicle for V2X communication where X means pedestrian, vehicle, or infrastructure/network, devices for Integrated Access and Backhaul (IAB), Small Data Transmission (SDT), mobility, Multicast and Broadcast Services (MBS), positioning, dynamic/flexible duplex in commercial networks, reduced capability (RedCap), Space borne vehicles or Air borne vehicles in Non-terrestrial networks (NTN) including Satellites and High Altitude Platforms (HAPs) encompassing Unmanned Aircraft Systems (UAS), eXtended Reality (XR) devices including different types of realities such as Augmented Reality (AR), Mixed Reality (MR) and Virtual Reality (VR), the unmanned aerial vehicle (UAV) commonly known as a drone which is an aircraft without any human pilot, devices on high speed train (HST), or image capture devices such as digital cameras, sensors, gaming devices, music storage and playback appliances, or Internet appliances enabling wireless or wired Internet access and browsing and the like. The 'terminal device' can further has 'multicast/broadcast' feature, to support public safety and mission critical, V2X applications, transparent IPv4/IPv6 multicast delivery, IPTV, smart TV, radio services, software delivery over wireless, group communications and IoT applications. It may be also incorporated one or multiple Subscriber Identity Module (SIM) as known as Multi-SIM. The term "terminal device" can be used interchangeably with a UE, a mobile

station, a subscriber station, a mobile terminal, a user terminal, a wireless device or a reduced capability terminal device.

[0037] As used herein, the term "network device" refers to a device which is capable of providing or hosting a cell or coverage where terminal devices can communicate. Examples of a network device include, but not limited to, a Node B (NodeB or NB), an evolved NodeB (eNodeB or eNB), a next generation NodeB (gNB), a transmission reception point (TRP), a remote radio unit (RRU), a radio head (RH), a remote radio head (RRH), an IAB node, a low power node such as a femto node, a pico node, a reconfigurable intelligent surface (RIS), Network-controlled Repeaters, and the like.

[0038] The terminal device or the network device may have Artificial intelligence (AI) or Machine learning capability. It generally includes a model which has been trained from numerous collected data for a specific function, and can be used to predict some information. The terminal or the network device may work on several frequency ranges, e.g. FR1 (410 MHz – 7125 MHz), FR2 (24.25 GHz to 71 GHz), 71 GHz to 114 GHz, and frequency band larger than 100 GHz as well as Tera Hertz (THz). It can further work on licensed/unlicensed/shared spectrum. The terminal device may have more than one connection with the network devices under Multi-Radio Dual Connectivity (MR-DC) application scenario. The terminal device or the network device can work on full duplex, flexible duplex and cross division duplex modes.

[0039] The network device may have the function of network energy saving, Self-Organizing Networks (SON)/ Minimization of Drive Tests (MDT). The terminal may have the function of power saving.

[0040] The embodiments of the present disclosure may be performed in test equipment, e.g. signal generator, signal analyzer, spectrum analyzer, network analyzer, test terminal device, test network device, channel emulator.

[0041] The embodiments of the present disclosure may be performed according to any generation communication protocols either currently known or to be developed in the future. Examples of the communication protocols include, but not limited to, the first generation (1G), the second generation (2G), 2.5G, 2.75G, the third generation (3G), the fourth generation (4G), 4.5G, the fifth generation (5G) communication protocols, 5.5G, 5G-Advanced networks, or the sixth generation (6G) networks.

[0042] In one embodiment, the terminal device may be connected with a first network

device and a second network device. One of the first network device and the second network device may be a master node and the other one may be a secondary node. The first network device and the second network device may use different radio access technologies (RATs). In one embodiment, the first network device may be a first RAT device and the second network device may be a second RAT device. In one embodiment, the first RAT device is eNB and the second RAT device is gNB. Information related with different RATs may be transmitted to the terminal device from at least one of the first network device and the second network device. In one embodiment, first information may be transmitted to the terminal device from the first network device and second information may be transmitted to the terminal device from the second network device directly or via the first network device. In one embodiment, information related with configuration for the terminal device configured by the second network device may be transmitted from the second network device via the first network device. Information related with reconfiguration for the terminal device configured by the second network device may be transmitted to the terminal device from the second network device directly or via the first network device.

[0043] As used herein, the singular forms 'a', 'an' and 'the' are intended to include the plural forms as well, unless the context clearly indicates otherwise. The term 'includes' and its variants are to be read as open terms that mean 'includes, but is not limited to.' The term 'based on' is to be read as 'at least in part based on.' The term 'one embodiment' and 'an embodiment' are to be read as 'at least one embodiment.' The term 'another embodiment' is to be read as 'at least one other embodiment.' The terms 'first,' 'second,' and the like may refer to different or same objects. Other definitions, explicit and implicit, may be included below.

[0044] In some examples, values, procedures, or apparatus are referred to as 'best,' 'lowest,' 'highest,' 'minimum,' 'maximum,' or the like. It will be appreciated that such descriptions are intended to indicate that a selection among many used functional alternatives can be made, and such selections need not be better, smaller, higher, or otherwise preferable to other selections.

[0045] The term "circuitry" used herein may refer to hardware circuits and/or combinations of hardware circuits and software. For example, the circuitry may be a combination of analog and/or digital hardware circuits with software/firmware. As a further example, the circuitry may be any portions of hardware processors with software

including digital signal processor(s), software, and memory (ies) that work together to cause an apparatus, such as a terminal device or a network device, to perform various functions. In a still further example, the circuitry may be hardware circuits and or processors, such as a microprocessor or a portion of a microprocessor, that requires software/firmware for operation, but the software may not be present when it is not needed for operation. As used herein, the term circuitry also covers an implementation of merely a hardware circuit or processor(s) or a portion of a hardware circuit or processor(s) and its (or their) accompanying software and/or firmware. In this disclosure, the subband and the frequency subband may be used interchangeable without any limitation. The group size of a RBG may be also referred to as the RBG size without any limitation. The time unit configured with SBFD communication may be also referred to as SBFD time unit, and the time unit not configured with SBFD communication may be also referred to as non-SBFD time unit. In this disclosure, the control channel may be interchangeably used with the physical downlink control channel (PDCCH) without any limitation. In this disclosure, the time unit may be any time duration, for example, symbol, slot and frame and so on.

[0046] As mentioned above, due to the mis-alignment between different SBFD time units or the interference between the subbands configured for different link directions, the CLI (for example, the intra-subband CLI or the inter-subband CLI) may occur in a frequency subband of a certain SBFD time unit. In this case, the measurement of the CLI size in this frequency subband should be obtained; in order to, for example, evaluate the communication performance or reduce the interference by scheduling the communication resources. That is, for SBFD operation, the way of measuring the CLI (for example, the inter-subband CLI) and reporting the measurement result should be specified.

[0047] At least for solving the above technical issues, the example embodiments of the disclosure propose a mechanism for CLI management. In this mechanism, a first terminal device receives a configuration from a network device. The configuration indicates a set of resources within a first frequency subband of a SBFD time unit that comprises frequency subbands not overlapped with each other. The first terminal device measures an inter-subband CLI size in this first frequency subband. This CLI size is associated with another second frequency subband (for example, a neighboring frequency subband) having a link direction from the first frequency subband. In an example, the CLI is caused by the signal transmitted in the other second frequency subband. Then, the terminal device transmits a measure report comprising the CLI size to the network device.

[0048] In this way, by means of this configuration, the terminal device may determine a CLI level in a subband of an SBFD, and feedback the CLI level to the network device by the measurement report. In turn, the network device may manage the CLI by scheduling the terminal device or the aggressor terminal device. Only for discussion simplicity without any limitation, the frequency subband of the SBFD may be also referred to as a subband.

[0049] For illustrative purposes, principle and example embodiments of the present disclosure will be described below with reference to Figs. 1A-5. However, it is to be noted that these embodiments are given to enable the skilled in the art to understand inventive concepts of the present disclosure and implement the solution as proposed herein, and not intended to limit scope of the present application in any way.

[0050] Fig. 1a illustrates an example environment 100 in which example embodiments of the present disclosure can be implemented.

[0051] The environment 100, which may be a part of a communication network, comprises a first terminal device 110, a second terminal device 120, a network device 130, a second network device 140 and a third terminal device 150. The network device 140 may be also referred to as a first network device 130 in this disclosure. In some embodiments, the communication network may include NTN, NB-IoT and/or eMTC. In some other embodiments, the communication network may include any other possible communication network. It is to be understood that the number of network devices and terminal devices is given only for the purpose of illustration without suggesting any limitations. The communication network may include any suitable number of network devices and/or terminal devices adapted for implementing embodiments of the present disclosure. Although not shown, it would be appreciated that one or more terminal devices may be located in the environment 100.

[0052] Without any limitation, the network device 130 and the second network device 140 supports the SBFD communication. For example, the network device 120 and the second network device 140 may transmit DL channel to the terminal device 110 and receive UL channel from another terminal device (for example, the third terminal device 150) in the SBFD time unit, simultaneously. In this disclosure, the non-SBFD time unit may be a UL only time unit or DL only time unit. As shown in Fig. 1a, the network device 130 may transmit a DL channel to the terminal device 110 and receive a UL channel from the

terminal device 120 in a SBFD time unit simultaneously. Meanwhile, even though the SBFD time units are divided into subbands in the same way, the DL channel received by the first terminal device 110 may be interfered by the UL channel transmitted from the second terminal device 120, for example, due to the energy leakage. In an example, the aggressor terminal device (the second terminal device 120) sends the UL signal/channel, such as SRS on the UL subband, and the victim terminal device (the first terminal device 110) measures the CLI-RSSI on the configured CLIM resource in DL subband. In this disclosure, the above case may be also referred to as "inter-subband UE-UE CLI". That is, for SBFD operation, UL/DL transmission in the UL/DL subband of one cell may interfere with DL/UL reception in another adjacent subband of the same or another cell.

[0053] In addition, at the first network device 130, the UL channel received from the second terminal device 120 may be also interfered by the DL channel transmitted from the second network device 140. In this disclosure, this case may be also referred to as "inter-subband gNB-gNB CLI".

[0054] Fig. 1b illustrates an example of inter-subband CLI that is caused by a neighboring subband.

[0055] As shown in Fig. 1b, a SBFD time unit is divided into a UL subband (U) and a DL subband (D). In this example, regarding the characteristics of the CLI, the inter-subband CLI may be non-uniform in the interfered subband. In some embodiments, as shown by the CLI size at the frequencies f_3, f_4 and f_5 in Fig. 1b, the CLI size is larger around the boundary (f_2) between subbands having different link directions and is smaller at the location that is far away from the boundary. In this case, some different strategies should be adopted for different frequency area in the DL subband to measure, mitigate or suppress the CLI. Furthermore, potential enhancements for UE-to-UE CLI measurement/report considering non-uniform CLI in DL subbands should be considered.

[0056] Fig. 2 illustrates a signaling process 200 for managing inter-subband CLI between terminal devices in the SBFD time units according to some embodiments of the present disclosure. For illustrative purposes, the process 200 will be described with reference to Fig. 1.

[0057] In the signaling process 200, the network device 130 transmits (201) a configuration to the first terminal device 110. The configuration indicates a set of resources within a SBFD time unit. The SBFD time unit is divided into a plurality of

subbands that does not overlap with each other. The plurality of subbands may be used for channel transmissions having different link directions. In some embodiments, the set of resources may be applied to more one subband. Alternatively, the configuration may indicate more than one set of resources in the more one subbands.

[0058] In some embodiments, the configuration is a common measurement configuration for measuring the inter-subband CLI size and an intra-subband CLI size in the subband. In this case, the measurement configuration may comprise a measurement type indication for the CLI. In an example, the CLI measurement type is included in the configuration or the elements (IE) of the configuration (which may be also referred to as the measurement resource configuration). For example, a parameter *CLI-MeasTypeConfig* can be included in the IE *MeasObjectCLI* or *RSSI-ResourceConfigCLI*. The candidate configured value includes UE-to-UE intra-cell inter-subband CLI Measurement or UE-to-UE inter-cell inter-subband CLI Measurement or UE-to-UE inter-cell intra-subband CLI Measurement. This may be also expressed as below:

CLI-MeasTypeConfig-r19 ::= **CHOICE** {intra-cell inter-subband CLI Measurement, intra-cell intra-subband CLI Measurement, inter-cell UE-to-UE inter-subband CLI Measurement, inter-cell UE-to-UE intra-subband CLI Measurement}
TCI-State Id information can be included in each RSSI-ResourceConfigCLI ID.

[0059] Only for discussion clarity and without any limitation, the subband including the indicated set of resources may be also referred to as a first subband. In turn, upon receiving (203) the configuration, the first terminal device 110 may be aware of the resource location for measuring the inter-subband CLI in the first subband.

[0060] In some embodiments, the set of resources indicated by the configuration may include one or a list of CLI measurement resources for inter/intra-subband CLI measurement. In addition, the configured CLI measurement resource for UE-to-UE inter/intra-subband CLI may include some continuous resource blocks (RB) corresponding to one or more subbands comprising the first subband. The one or more subbands have the same link direction, for example UL. If the one or more subbands have the same frequency bandwidth, the set of resources may be applied to each of the one or more subbands. That is, the terminal device 110 may determine a respective set of resources in

each of the one or more subbands based on the set of resource. For example, the set of resources is configured in the same location of each of the plurality of subbands. Otherwise, if the one or more subbands do not have the same frequency, then each measured resource is separately configured by indicating starting PRB and ending/number of PRB for each of the one or more subbands.

[0061] In an example, if the frequency structure of the SBFD time unit is [D, U] or [U, D]. That is, there is only one DL and one UL subband in the SBFD time unit, then the CLI measurement resource may be indicated by the starting physical resource block (PRB) and the ending PRB or the number of the PRBs in the DL/UL subband. In addition, the number of time units to be measured is the same as the number of the SBFD time units. Alternatively, if the frequency structure of the SBFD time unit is the [D,U,D], and if two DL subbands is symmetric and the bandwidth is the same, then the set of measurement resources (or the measurement reports as discussed in the following) can be applied to one or two DL subbands. For example, a subband index (acting as a subband CLI measurement subband enabling field) can be included in the configuration to indicate the subband which the set of resource is applied. In this case, the terminal device 110 may determine the set of resources in the subband that the corresponding subband index indicated. Otherwise, separate set of resources can be individually configured in different DL subbands. That is, indicating the starting PRB index and the ending PRB index or the PRB number in each DL subband indication.

[0062] Alternatively, in some embodiments, the configuration transmitted at step 201 is dedicated to measuring the inter-subband CLI. In some embodiments, configuration indicates at least one inter-subband CLI resource, and the at least one inter-subband CLI resource being indicated by at least one of: a transmission configuration indication (TCI) state identification (ID), a starting physical resource block (PRB) index, an ending PRB index, a number of PRBs, a sub-carrier spacing (SCS), or measuring periodicity and offset.

[0063] In an example, when the set of resources is configured by the network device 130, the first terminal device 110 shall be able to perform inter-subband CLI-received signal strength indicator (RSSI) measurement of configured *rssi-Resource-Inter-subband-CLIConfig*. The above configuration (which may be also referred to as the inter-subband CLI measurement configuration) may indicate a list of inter-subband RSSI-CLIM resource in one or two subbands, and each set of resources (which may be also referred to as the inter-subband RSSI-CLI measurement resource) may

have an ID and includes below parameters, such as the SCS, starting PRB, ending PRB, number of PRB, measured PeriodicityAndOffset, TCI-StateId, cell index, and starting symbol position and number of symbols can be also included (if these two parameters are not included, then the defaulted measured symbols equals to the SBFD symbols). This may be also expressed as below:

```
rssi-Resource-Inter-subband-CLIConfig-r19 ::= SEQUENCE {
 rssi-ResourceId-r19 RSSI-ResourceId-r19,
 rssi-SCS-r19 SubcarrierSpacing,
 startPRB1-r19 INTEGER (0..2169),
 nrofPRBs1-r19 INTEGER (4..maxNrofPhysicalResourceBlocksPlus1),
 startPRB2-r19 INTEGER (0..2169),
 nrofPRBs2-r19 INTEGER (4..maxNrofPhysicalResourceBlocksPlus1),
 startSymbolPosition-r19 INTEGER (0..13),
 nrofSymbols-r19 INTEGER (1..14),
 rssi-PeriodicityAndOffset-r19 RSSI-PeriodicityAndOffset-r19,
 TCI-StateId,
 refServCellIndex-r19 ServCellIndex OPTIONAL, -- Need S
 ...
}
```

In addition, the structure of the set of resources may be also configured in different ways; these are further discussed with reference to Figs. 3a and 3b.

[0064] Then, the network device 130 may also transmit (205) the configuration to the second terminal device 120. The second terminal device 120 includes any electronic device that may cause the intra-subband or inter-subband CLI at the first terminal device 110. Upon receiving this configuration, the second terminal device 120 is also aware the resource location for measuring the inter-subband CLI in the subband. In turn, the second terminal device 120 may transmit signals for the CLI measurement on another subband in this SBFD. The other subband has a different link direction. For example, the first

subband is a UL or DL subband, and the other subband is a neighboring DL or UL subband. Only for discussion clarity and without any limitation, the other subband may be also referred to as the second subband. In some embodiments, the second terminal device 120 is served by the second network device 140. In this case, the network device 130 and the second network device 140 may exchange the SBFD assistance information with each other through Xn and F1 interfaces. In some embodiments, the SBFD assistance information may comprise the configuration as discussed above. Then, the second network device 140 may transmit the configuration to the second terminal device 120 accordingly.

[0065] In some embodiments, the SBFD assistance information may also include the elements as shown in the following table 1.

Table 1

IE/Group Name	Presence	Range	IE type and reference	Semantics description
The bandwidth of DL/UL sub-band	M		9.3.1.x	The BW for gNB-gNB CLI-RSSI measurement.
CLI-RSSI measurement resource configurations	M		9.3.1.x	The resource for gNB-gNB CLI-RSSI. measurement, including the symbols and the RBs, the list of TCI states in each subband.
The allocation of sub-band	M		9.3.1.x	The UL/DL subband position.
The CLI-RSSI Report configuration information	M		9.3.1.x	A periodic and offset and the measured RB set configuration.

[0066] At the second terminal device 120, as discussed above, the second terminal device transmits (209) at least one CLI-RS on the second subband to the first terminal device 110. In some embodiments, the CLI-RS may be a sounding reference signal (SRS). In turn, the first terminal device 110 may perform (211) channel receiving on the first subband of the SBFD time unit. The first terminal device 110 measures (213), on the set of resources indicated by the configuration, an inter-subband CLI size caused by the CLI RSs transmitted in the second subband. In some embodiments, the set of resources indicated by the configuration may comprise a plurality of resource subsets. For the clarity of discussing the CLI-measurement, the set of resources comprising the plurality of resource subsets are discussed with reference to Figs. 3a and 3b at first.

[0067] Fig. 3a illustrates a structure example of measurement resource configuration according to some embodiments of the present disclosure.

[0068] As shown in Fig. 3a, in some embodiments, the set of resources may comprise a

plurality of uniformed resource subsets. For example, the plurality of uniformed resource subsets each has the same frequency bandwidth. In this case, the configuration may indicate a number (K) of resource blocks shared among the plurality of uniformed resource subsets. Then, the first terminal device 110 may be aware of the number of physical resource blocks in each of the plurality of uniformed resource subsets. Alternatively, the configuration may also indicate a resource block (RB) size for each of the plurality of uniformed resource subsets. In some embodiments, the plurality of uniformed resource subsets is continuous, and the resource subset farthest away from the boundary may have a different number of resource blocks. As shown in Fig. 3a, the resource subsets 310, 320 and 330 may have the same number of RBs as discussed above; that is, these subsets have the same bandwidth 340. For the farthest resource subset, the number of remaining RBs of the first subband is smaller than K. Then, the number of remaining RBs of the subband may form the last resource subset. In some embodiments, the shared RB set size or K for resource subset can be configured based on the first subband size. Such as the shared RB set size k for the first subband can be as the below table.

Table 2

DL subband (the number of PRBs)	resource subset size
24 – 72	2, 4
73 – 144	4, 8
145 – 275	8, 16

[0069] In this case, when the first terminal device 110 measures the CLI size, the terminal device 110 may determine the respective CLI levels on different portions of the first subband. The measurement report (which will discussed in the following) comprising these respective CLI levels can help the network device 130 to schedule suitable bandwidth for physical downlink shared channel (PDSCH).

[0070] Fig. 3b illustrates a structure example of measurement resource configuration according to some embodiments of the present disclosure.

[0071] Alternatively, in some embodiments, the configuration may individually indicate each of the plurality of resource subsets. In this case, each of the plurality of resource subsets may have a separate number of RBs or a separate frequency bandwidth. In this case, the configuration will give RB set index for the resource subset and the RBs in each

measured RB set, for example, including the starting PRB index and the number of PRB/end of PRB index. In some embodiments, the bandwidth of the resource subset closer to the boundary between the first subband and the second subband may have a smaller bandwidth for a finer CLI measurement. In this way, the CLI size around the boundary may be measured more accurate.

[0072] As shown in Fig. 3b, the resource subset 370, 380 and 390 may have different number RBs or different RB set size. For example, the number of RBs (or the bandwidth 391) of the resource subset 391 is smaller than the number of RBs (or the bandwidth 393) of the resource subset 390.

[0073] Referring back to Fig. 2, after measuring the inter-subband CLI size, the first terminal device 110 transmits (215) a measurement report (which may be also referred to as an inter-subband CLI measurement report) to the network device 130. The measurement report comprises the measured CLI size. In some embodiments, the CLI size is the received signal strength indicator (RSSI) measured in the first subband. In an example, the measurement quantity for UE/gNB to perform inter-subband CLI measurement for SBFD symbols can be RSSI. Then, the victim UE/gNB can perform inter-subband CLI-RSSI measurements on the configured CLI resource. The RSSI can be revised based on the CLI-RSSI definition in TS 38.215 as below.

Definition	CLI Received Signal Strength Indicator (CLI-RSSI), is defined as linear average of the total received power (in [W]) observed only in the configured OFDM symbols of the configured measurement time resource(s) <u>or SBFD symbols</u>, in the configured measurement bandwidth from all sources, including co-channel serving and non-serving cells, adjacent channel <u>or subband</u> interference, thermal noise etc. For frequency range 1, the reference point for the RSSI shall be the antenna connector of the UE. For frequency range 2, CLI-RSSI shall be measured based on the combined signal from antenna elements corresponding to a given receiver branch. For frequency range 1 and 2, if receiver diversity is in use by the UE, the reported CLI-RSSI value shall not be lower than the corresponding CLI-RSSI of any of the individual receiver branches.

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[0074] The above embodiments may be also expressed as below

The UE capable of performing inter-subband CLI measurements shall be able to measure inter-subband CLI-RSSI which are defined in TS38.215 within DL subband. For performing inter-subband CLI measurement in FR2, if TCI-StateId is not configured, UE can assume the configured CLI measurement resources are QCL-ed with Type D to one of the latest received PDSCH and the latest monitored CORESET

[0075] Alternatively, the CLI size is a CLI level determined based on the measured RSSI value. For example, a quantized value determined from the RSSI.

[0076] In some embodiments, the measurement report is transmitted according to a reportType. The reportType may be periodic or event triggered. For example, the measurement report may be transmitted periodically. For periodic reporting, the configured parameters including:

```
Inter-subband-CLI-PeriodicalReportConfig-r19 ::= SEQUENCE {
reportInterval-r19 ReportInterval,
reportAmount-r19 ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
reportQuantityCLI-r19 MeasReportQuantityCLI-r19,
maxReportCLI-r19 INTEGER (1..maxCLI-Report-r19),
}
```

[0077] In addition or alternatively, the measurement report may be transmitted in response to an event, for example, if the CLI size is above a CLI threshold (which may be also referred to as the second CLI threshold). A specific event for triggering inter-subband CLI reporting can be defined, and the event is based on CLI measurement results, such as the measured inter-subband CLI-RSSI value exceed the configured threshold.

[0078] For the event triggered reporting including the below parameters.

```
Inter-subband-CLI-EventTriggerConfig-r19 ::= SEQUENCE {
    eventId-r19 CHOICE {
    eventI1-r19 SEQUENCE {
    i1-Threshold-r19 MeasTriggerQuantityCLI-r19,
    reportOnLeave-r19 BOOLEAN,
    hysteresis-r19 Hysteresis,
    timeToTrigger-r19 TimeToTrigger
    },
    },
    reportInterval-r19 ReportInterval,
    reportAmount-r19 ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
    maxReportCLI-r19 INTEGER (1..maxCLI-Report-r19),
    ...
```

[0079] In addition, the measurement report may include the following CLI measurement information, such as:

- Measurement results (CLI-RSSI value or level) per inter-subband CLI-RSSI resource (for example, the resource subset);
- Inter-subband CLI-RSSI resource(s)/RB set indexes.

[0080] In addition, as mentioned above, the set of resources may comprise the plurality of resource subsets which may be uniformed or non-uniformed (as shown in Figs. 3a and 3b). For the uniformed resource subsets, a finer granularity, smaller than DL subband size, such as RB set based CLI-CSI reporting can be considered. The DL subband can be divided into multiple smaller RB sets, and each RB set includes K continuous PRB, and the number

of the PRB in the last RB set in the DL subband may less than K. A CLIM reporting matric may be introduced. The CLIM reporting matrix include the inter-subband CLI for different RB set in the DL subband, and these reporting can help gNB to schedule suitable bandwidth for PDSCH. Only as an example, the CLIM reporting matrix may be shown by the following table 3.

Table 3

	Time unit0	Time unit1	Time unit2	Time unit3	Time unit4	Time unit5	Time unit6
RB set 0	Level 0	Level 1	Level 1	Level 0	Level 0	Level 1	Level 0
RB set 1	Level 0	Level 1	Level 0	Level 1	Level 1	Level 2	Level 0
RB set 2	Level 1	Level 0	Level 0	Level 0	Level 2	Level 1	Level 0
RB set 3	Level 1	Level 0	Level 0	Level 0	Level 1	Level 0	Level 0

[0081] In this matrix, each element is associated with a respective resource subset of the plurality of resource subsets and the SBFD time unit. That is, the measurement report may include the CLI size in subbands of one or more SBFD time units, as shown by Time unit 0 to Time unit 6. The RB sets 0 to 3 are the plurality of resource subsets as discussed above.

[0082] In addition, although the element in the Table 3 is shown as the CLI level, the element of the matrix may be also the measured RSSI. The following table 4 shows an example relationship between the RSSI and the CLI level.

Table 4

Inter-subband CLI level	Measured RSSI quantity value range (dBm)
CLI level 0	<-100
CLI level 1	{-100, -80}
CLI level 2	{-80, -60}

CLI level 3	{-60, -40}
CLI level 4	>-40

[0083] For un-uniformed resource subsets, the first terminal device 110 may transmit the measurement in the same way. For example, the the first terminal device 110 may report inter subband UE to UE per subband or RB set (for example, resource subset). In this case, the measure resource configuration will give RB set index and the RBs in each measured RB set, including the starting PRB index and the number of PRB/end of PRB index. As such, the first terminal device 110 will report the measurement results (CLI-RSSI value or level) per RB set.

[0084] In addition or alternatively, the first terminal device 110 may use the RB set differential CLI-CSI method to report the inter-subband CLI for different RB set. In some embodiments, the measurement report comprises a CLI size for a first resource subset of the plurality of resource subsets and at least one CLI offset value for at least one another resource subset of the plurality of resource subsets. The first resource subset may be the resource subset having the lowest CLI size or any other resource set (for example, the first one of the plurality of resource subsets). Then, the relative offset value is reported for the remaining resource subset in this first subband.

[0085] In addition, the measurement report may only contain a part of the CLI measurement results. For example, the CLI sizes in the measurement report include the CLI sizes that are above another CLI threshold (which may be also referred to as the first CLI threshold). If the measured CLI is not exceeded the threshold then no need to report the RB set index (and corresponding CLI size). Alternatively, the first terminal device 110 reports the inter-subband CLI level based on the measured RSSI range of each level in each reported RB set according to the configuration.

[0086] In addition, the measurement report may be identified by a reporting identification (ID). The reporting ID may be associated with at least one of an ID of the configuration or another ID of each of the plurality of resource subsets.

[0087] In an example, the ID of the set of resources indicated by the configuration (for example, one CLI-RSSI measurement resource ID) is associated with one reporting ID. As mentioned above, and the set of resources may across two subbands (for example, two

DL subbands).

[0088] Alternatively: two or more sets of resources (for example, indicated by two or more above configurations) may be configured to be associated with the same reporting ID. This may be also referred to as below:

```
CLI-ReportConfig ::= SEQUENCE {
reportConfigId                                    CSI-ReportConfigId,
resourcesForCLIMeasurement        {CSI-ResourceConfig1, CSI-ResourceConfig2, ……
CSI-ResourceConfigM}
reportFreqConfiguration SEQUENCE { CLI-FormatIndicator ENUMERATED { RB set
CLI, subband CLI } -- Need R
cli-ReportingBand CHOICE {
RB set1 BIT STRING(SIZE(1)),
RB set2 BIT STRING(SIZE(2)),
RB set3 BIT STRING(SIZE(3)),
 RB set4 BIT STRING(SIZE(4)),
…… }
```

[0089] Alternatively, one measurement report may comprise all CLI measurement sizes corresponding to each resource subsets across two DL subbands.

[0090] Referring back to Fig. 2, after receiving (217) the measurement report, the network device 130 may perform the CLI management to reduce the CLI size in the first subband.

[0091] In some embodiments, different frequency densities can be configured for measurement reference signals in different frequency area, in order to ensure the inter-subband CLI measurement accuracy or intra-frequency CSI-RS measurement accuracy. For discussion clarity, the above embodiment is further discussed with reference to Fig.4a.

[0092] Fig. 4a illustrates an example of a channel state information-reference signal (CSI-RS) configuration for reducing the inter-subband CLI effect according to some

embodiments of the present disclosure.

[0093] In an example, the network device 130 transmits (219) to the first terminal device 110 a first density indication of a channel state information-reference signals (CSI-RS). The first density indication is indicative of a first density and a second density, and the first density is higher than the second density. Furthermore, the first density is associated with a first portion of the first subband and the second density is associated with a second portion of the first subband. The first potion (410) is closer to a boundary between the first subband and the second subband than the second portion (420). After receiving (221) the first density indication, the first terminal device 110 may receive or measure the CSI-RS accordingly.

[0094] As shown in Fig. 4a, for the area nearest to the DL and UL subband boundary, larger CSI-RS density, such as 3 RE for each PRB is applied or configured considering the largest inter-subband CLI for this area, and for the far area of the frequency position, smaller CSI-RS density, such as one RE in two PRB can be used for this area. And the medium frequency area can use CSI-RS density 1; that is one PRB has one RE CSI-RS. The density information can be exchanged to other neighbour gNB through Xn and F1 interfaces. For ensuring the CSI-RS measurement accuracy in DL subband, these different configurations can suppress the inter-subband CLI influence to the DL measurement. Although the above first density indication is discussed with reference to inter-subband UE to UE CLI, it may be also applied in inter-subband gNB to gNB CLI without any limitation.

[0095] Referring back to Fig. 2a, in addition or alternatively, the modulation and coding scheme (MCS) may be also adjusted to reduce the CLI effect. In some embodiments, the network device 110 may transmit (225) an order indication of MCS. The order indication is indicative of a first order and a second order, and the first order is lower than the second order. Similarly, the first order is associated with a first portion of the subband and the second order is associated with a second portion of the subband.

[0096] Fig. 4b illustrates an example of a modulation and coding scheme (MCS) configuration for reducing the inter-subband CLI effect according to some embodiments of the present disclosure.

[0097] In an example, the second order indication may be also embodied as a frequency factor or the frequency offset factor relative to the first MCS order. In this case, a frequency factor or the frequency offset factor can be added in the applied MCS for

transmitted PDSCH/PUSCH in different frequency area, the offset is relative to the boundary of the DL/UL subband, that is non-uniform MCS can be used for the PDSCH/PUSCH to compete the non-uniform inter-subband CLI for different PRB. As shown in Fig. 4b, the factor 427, 429 and 431 represents the frequency factors or the frequency offsets.

[0098] In this way, different MCSs (for example, different MCS orders) are applied to different frequency positions (423 and 425), and for the area nearest to the DL and UL subband boundary, smallest MCS is applied considering the largest inter-subband CLI for this area, and for the far area of the frequency position, larger MCS can be used for this area. Alternatively, different factor for MCS can be applied in different frequency positions. In this case, only one MCS is configured or indicated.

[0099] Referring back to Fig. 2, after receiving (225) the order indications, the first terminal device 110 may adjust the MCS accordingly.

[00100] In addition or alternatively, the network device 130 may indicate (219) the aggressor terminal device (for example, the second terminal device 120) to adjust the transmit power in order to reduce the CLI effect. In some embodiments, the network device 130 may transmit a power indication. The power indication is indicative of a first power and a second power, and the first power is lower than the second power. Similarly, the first power is associated with a first portion of the subband and the second power is associated with a second portion of the subband. Upon receiving (221) the power indication, the aggressor terminal device may adjust the transmit power accordingly. For discussion clarity, the above embodiment is further discussed with reference to Fig. 4c.

[00101] Fig. 4c illustrates an example of a power configuration for reducing the inter-subband CLI effect according to some embodiments of the present disclosure.

[00102] As shown in Fig. 4c, the second power is indicated based on the first power and a frequency offset factor or a frequency factor (as shown by the reference number 437, 439 and 441). In this way, a frequency factor may be added in the applied power for UL/DL transmission in different frequency area, and non-uniform power for different frequency area can be used for UL/DL transmission to alleviate the inter-subband CLI. As such, the second terminal device 120 may transmit the first portion 433 and the second portion 435 using different transmit power when transmitting the UL subband as shown in Fig. 4c.

[00103] For example, if the aggressor terminal device is scheduled/configured with the

PUSCH/physical uplink control channel (PUCCH) on the RBs closer to an adjacent DL subband, then a smaller power parameter may be applied. For example, the factor 1=0.2 maybe configured or indicated compared to the scheduled PUSCH/PUCCH that allocated RBs further away from the adjacent subband. If the aggressor terminal device is scheduled/configured with the PUSCH/PUCCH on the RBs far away from an adjacent DL subband, then a larger power parameters (factor) may be configured. Alternatively, if the scheduled/configured PUSCH/PUCCH crosses two or more different CLI level frequency areas, then the smallest power may be used. In this disclosure, adjacent Channel Leakage power Ratio (ACLR) for inter-subband CLI is the ratio of the filtered mean power centered on the assigned channel frequency to the filtered mean power centered on an adjacent subband in area that nearest to the DL/UL subband edge.

[00104] Referring back to Fig. 2, in addition or alternatively, in some embodiments, the network device 130 may also adjust the density of the demodulation reference signal (DMRS) or DMRS type for the first terminal device 110. For example, the network device 130 may transmit (227) a second density indication of a DMRS. The second density indication is indicative of a first density type and a second density type, and the first density type is higher than the second density type. Similarly, the first type is associated with the first portion of the subband and the second type is associated with the second portion of the subband. Upon receiving (229) the second density indication, the first terminal device 110 may adjust the DMRS receipt accordingly. For discussion clarity, the above embodiment is further discussed with reference to Fig. 4d.

[00105] Fig. 4d illustrates an example of a demodulation reference signal (DMRS) configuration for reducing the inter-subband CLI effect according to some embodiments of the present disclosure.

[00106] As shown in Fig. 4d, different frequency densities can be configured for DMRS in different frequency area (as shown by 443 and 445) to ensure the channel estimation accuracy and to suppress the inter-subband CLI caused by the UL transmission of the second terminal device 120 in the adjacent UL subband.

[00107] In an example, for the scheduled PDSCH on the RBs closer to an adjacent DL subband, a DMRS dense type1 (443) may be configured. For the scheduled PDSCH on the RBs away from an adjacent DL subband, a sparse type2 DMRS (445) may be configured in this frequency area. By means of the different DMRS configurations, the

inter-subband CLI of the UL subband to the PDSCH receiving can be suppressed.

[00108] In this way, the inter-subband UE to UE CLI may be measured and reported by the victim terminal device. With the measurement report, the network device may manage the CLI effect by scheduling the victim terminal device and the aggressor device. As such, the CLI effect can be handled.

[00109] In turn, the inter-subband gNB to gNB CLI may be also managed in a similar way except for a few differences associated with the network device characteristics.

[00110] Fig. 5 illustrates a signaling process 500 for managing inter-subband CLI between network devices in the SBFD time units according to some embodiments of the present disclosure. For illustrative purposes, the process 200 will be described with reference to Fig. 1.

[00111] In the signaling process 500, the network device 130 (which may be referred to as the first network device 130 in the following) obtain (510) a configuration indicating a set of resources within a subband of a SBFD time unit. The configuration may be the same as the above configuration discussed with reference to Fig. 2. The second network device 140 also obtains (520) this configuration for the CLI management. In some embodiments, the first network device 110 may determine the configuration directly and inform (503) the configuration to the second network device 140 and vice versa (501). In some embodiments, the first network device 130 and the second network device 140 may also receive the configuration from an authentication management function (AMF) function.

[00112] Then, the second network device 140 transmits (530), to the first network device 130, an inter-subband CLI-RS on another subband of the SBFD time unit. The other subband has a link direction different from the above subband. In turn, upon receiving (540) the CLI-RS, the first network device 110 measures (550), on the set of resources indicated by the configuration, at least one inter-subband CLI size associated with the other subband of the SBFD time unit.

[00113] Then, the first network device 130 may indicate the second network device 140 to adjust transmit power to reduce the CLI. For example, the first network device 130 transmits the power indication to the second network device 140. This power indication may be the same as that discussed with reference to Fig. 2. In addition or alternatively, the first network device 130 may also schedule the terminal device which UL transmission is affected by the CLI. For example, the first network device 130 may transmit a first

density indication of a sounding reference signal (SRS). This first density indication may be as similar as the first density indication of CSI-RS in Fig. 2. In addition or alternatively, the first network device 130 may also transmit the second density indication of the DMRS and/or an order indication of MCS to the terminal device. These indications may be same as the corresponding indications in Fig. 2.

[00114] In addition or alternatively, the first network device 130 may also transmit a measurement report to the second network device 140, and the second network device 140 may adjust the DL transmission based on the measurement report accordingly. This measurement report may be the same as the measurement report as discussed with reference to Fig. 2. In addition, the information exchanged between network devices in the signaling process 200 may be also contained in the signaling process 500, without any limitation.

[00115] In this way, the inter-subband gNB to gNB CLI may be also measured, reported and/or handled at the network device.

[00116] Fig. 6 illustrates a flowchart of a method 600 of communication implemented at a terminal device in accordance with some embodiments of the present disclosure. The method 600 can be implemented at the terminal device 110 shown in Fig. 1. For the purpose of discussion, the method 600 will be described with reference to Fig. 1. It is to be understood that the method 600 may include additional acts not shown and/or may omit some shown acts, and the scope of the present disclosure is not limited in this regard.

[00117] At 610, the terminal device 110 receives a configuration indicating a set of resources within a subband of a SBFD time unit from the network device 130. The SBFD time unit comprises subbands not overlapped with each other. At 620, the terminal device 110 measures, on the set of resources, an inter-subband CLI size associated with another subband of the SBFD time unit. The other subband has a link direction different from the subband. At 630, the terminal device 110 transmits a measurement report comprising the CLI size to the network device 130.

[00118] In some embodiments, the other subband is a neighboring subband of the subband, and wherein the CLI size comprises at least one of: a received signal strength indicator (RSSI); or a CLI level that is determined based on the RSSI.

[00119] In some embodiments, the configuration is a common measurement configuration for measuring the inter-subband CLI size and an intra-subband CLI size in the subband, the

inter-CLI in the subband is caused by a signal transmitted on the other subband, and the intra-subband CLI in the subband is caused by another signal transmitted on a frequency band that at least partially overlaps with the first subband. In some embodiments, the configuration comprises a measurement type indication for the CLI.

[00120] In some embodiments, the first subband is one of a plurality of subbands in the SBFD time unit. The plurality of subbands has the same frequency bandwidth and the same link direction, and the terminal device further determines a respective set of resources in each of the plurality of subbands based on the set of resource; measure a respective CLI size on the respective set of resources; and transmit the measurement report comprising the respective CLI size.

[00121] In some embodiments, the configuration comprises a CLI measurement subband enabling field indicating at least one of the plurality of subbands, and wherein the terminal device is caused to determine the respective set of resources by: determining the respective set of resources in the at least one subband.

[00122] In some embodiments, the configuration is dedicated to measuring the inter-subband CLI, and wherein the configuration indicates at least one inter-subband CLI resource, and the at least one inter-subband CLI resource being indicated by at least one of: a transmission configuration indication (TCI) state identification (ID); a starting physical resource block (PRB) index; an ending PRB index; a number of PRBs; a sub-carrier spacing (SCS); or measuring periodicity and offset.

[00123] In some embodiments, the configuration indicates the set of resources that comprises a plurality of resource subsets.

[00124] In some embodiments, the configuration further indicates a number of resource blocks shared among the plurality of resource subsets, and wherein the CLI measurement report comprises a CLI size measured in a resource subset of the plurality of resource subsets.

[00125] In some embodiments, the configuration individually indicate each of the plurality of resource subsets, and wherein the CLI measurement report comprises a CLI size measured in a resource subset of the plurality of resource subsets.

[00126] In some embodiments, the measurement report comprises a CLI size for a resource subset of the plurality of resource subsets and at least one CLI offset value for at least one another resource subset of the plurality of resource subsets.

[00127] In some embodiments, the CLI size measured in the resource subset is above a first CLI threshold. In some embodiments, a reporting identification (ID) of the measurement report is associated with at least one of an ID of the configuration or another ID of each of the plurality of resource subsets.

[00128] In some embodiments, the measurement report comprises a CLI level matrix. An element in the CLI level matrix is associated with a respective resource subset of the plurality of resource subsets and the SBFD time unit. The element is determined based on a RSSI.

[00129] In some embodiments, the measurement report is transmitted based on the CLI size being above a second CLI threshold; or the measurement report is transmitted periodically.

[00130] In some embodiments, the terminal device 110 further receives, from the network device 130, a first density indication of a channel state information-reference signal (CSI-RS). The first density indication is indicative of a first density and a second density, the first density being higher than the second density. The first density is associated with a first portion of the subband and the second density is associated with a second portion of the subband. The first potion is closer to a boundary between the subband and the other subband than the second portion.

[00131] In some embodiments, the terminal device 110 further receives, from the network device 130, an order indication of a modulation and coding scheme (MCS), the order indication being indicative of a first order and a second order, the first order being lower than the second order, and wherein the first order is associated with a first portion of the subband and the second order is associated with a second portion of the subband, the first portion being closer to a boundary between the subband and the other subband than the second portion.

[00132] In some embodiments, the terminal device 110 further receives, from the network device, a second density indication of a demodulation reference signal (DMRS), the second density indication being indicative of a third density and a fourth density, the third density type being higher than the fourth density, and wherein the third density is associated with a first portion of the subband and the fourth density is associated with a second portion of the subband, the first portion being closer to a boundary between the subband and the other subband than the second portion.

[00133] Fig. 7 illustrates a flowchart of a method 700 of communication implemented at a network device in accordance with some embodiments of the present disclosure. The method 700 can be implemented at the network device 130 shown in Fig. 1. For the purpose of discussion, the method 700 will be described with reference to Fig. 1. It is to be understood that the method 700 may include additional acts not shown and/or may omit some shown acts, and the scope of the present disclosure is not limited in this regard.

[00134] At 710, the network device 130 transmits, to at least one of a first terminal device 110 and a second terminal device 120, a configuration indicating a set of resources within a subband of a SBFD time unit that comprises subbands not overlapped with each other. At 720, the network device 130 receives, from the first terminal device 110, a measurement report comprising an inter-subband CLI size in the subband. The CLI size is associated with another subband of the SBFD time unit. The other subband has a link direction different from the subband.

[00135] In some embodiments, the other subband is a neighboring subband of the subband, and wherein the CLI size comprises at least one of: a received signal strength indicator (RSSI); or a CLI level that is determined based on the RSSI.

[00136] In some embodiments, the configuration is a common measurement configuration for measuring the inter-subband CLI size and an intra-subband CLI size in the subband, the inter-CLI in the subband is caused by a signal transmitted on the other subband, and the intra-subband CLI in the subband is caused by another signal transmitted on a frequency band that at least partially overlaps with the first subband.

[00137] In some embodiments, the configuration comprises a measurement type indication for the CLI. In some embodiments, the configuration comprises a CLI measurement subband enabling field indicating at least one of the plurality of subbands.

[00138] In some embodiments, the configuration is dedicated to measuring the inter-subband CLI, and wherein the configuration indicates at least one inter-subband CLI resource, and the at least one inter-subband CLI resource being indicated by at least one of: a transmission configuration indication (TCI) state identification (ID); a starting physical resource block (PRB) index; a ending PRB index; a number of PRBs; a sub-carrier spacing (SCS); or measuring periodicity and offset.

[00139] In some embodiments, the configuration indicates the set of resources that comprises a plurality of resource subsets. In some embodiments, the configuration further

indicates a number of resource blocks shared among the plurality of resource subsets, and wherein the CLI measurement report comprises a CLI size measured in a resource subset of the plurality of resource subsets.

[00140] In some embodiments, the configuration individually indicate each of the plurality of resource subsets, and wherein the CLI measurement report comprises a CLI size measured in a resource subset of the plurality of resource subsets.

[00141] In some embodiments, the measurement report comprises a CLI size for a resource subset of the plurality of resource subsets and at least one CLI offset value for at least one another resource subset of the plurality of resource subsets.

[00142] In some embodiments, the CLI size measured in the resource subset is above a first CLI threshold.

[00143] In some embodiments, a reporting ID of the measurement report is associated with an ID of each of the plurality of resource subsets.

[00144] In some embodiments, the measurement report comprises a CLI level matrix. An element in the CLI level matrix is associated with a respective resource subset of the plurality of resource subsets and the SBFD time unit, and wherein the element is determined based on a RSSI.

[00145] In some embodiments, the measurement report is transmitted based on the CLI size is above a second CLI threshold; or the measurement report is transmitted periodically.

[00146] In some embodiments, the network device 130 further transmits, to the first terminal device, a first density indication of a channel state information reference signal (CSI-RS), the first density indication being indicative of a first density and a second density, the first density being higher than the second density, and wherein the first density is associated with a first portion of the subband and the second density is associated with a second portion of the subband, the first potion being closer to a boundary between the subband and the other subband than the second portion.

[00147] In some embodiments, the network device 130 further transmits, to the first terminal device, an order indication of a modulation and coding scheme (MCS), the order indication being indicative of a first order and a second order, the first order being lower than the second order, and wherein the first order is associated with a first portion of the subband and the second order is associated with a second portion of the subband, the first

portion being closer to a boundary between the subband and the other subband than the second portion.

[00148] In some embodiments, the network device 130 further transmits, to the first terminal device, a second density indication of a demodulation reference signal (DMRS), the second density indication being indicative of a first density type and a second density type, the first density type being higher than the second density type, and wherein the first type is associated with a first portion of the subband and the second type is associated with a second portion of the subband, the first portion being closer to a boundary between the subband and the other subband than the second portion.

[00149] In some embodiments, the network device 130 further transmits, to the second device that causes the CLI in the subband, a power indication, the power indication being indicative of a first power and a second power, the first power being lower than the second power, and wherein the first power is associated with a first portion of the subband and the second power is associated with a second portion of the subband, the first portion being closer to a boundary between the subband and the other subband than the second portion.

[00150] Fig. 8 illustrates a flowchart of a method 800 of communication implemented at a terminal device in accordance with some embodiments of the present disclosure. The method 800 can be implemented at the terminal device 120 shown in Fig. 1. For the purpose of discussion, the method 800 will be described with reference to Fig. 1. It is to be understood that the method 800 may include additional acts not shown and/or may omit some shown acts, and the scope of the present disclosure is not limited in this regard.

[00151] At 810, the terminal device 120 receives a configuration from a network device 130. The configuration indicates a set of resources within a subband of a SBFD time unit that comprises subbands not overlapped with each other. At 820, the terminal device 120 transmits to a terminal device 110, an inter-subband CLI-RS on another subband of the SBFD time unit. The other subband has a link direction different from the subband.

[00152] In some embodiments, the terminal device 120 further receives, from the network device 130, a power indication, the power indication being indicative of a first power and a second power, the first power being lower than the second power, and wherein the first power is associated with a first portion of the subband and the second power is associated with a second portion of the subband, the first portion being closer to a boundary between the subband and the other subband than the second portion.

[00153] Fig. 9 illustrates a flowchart of a method 900 of communication implemented at a network device in accordance with some embodiments of the present disclosure. The method 900 can be implemented at the first network device 130 shown in Fig. 1. For the purpose of discussion, the method 900 will be described with reference to Fig. 1. It is to be understood that the method 900 may include additional acts not shown and/or may omit some shown acts, and the scope of the present disclosure is not limited in this regard.

[00154] At 910, the first network device 130 obtains a configuration indicating a set of resources within a subband of a SBFD time unit that comprises subbands not overlapped with each other. At 920, the first network device measures, on the set of resources, an inter-subband CLI size associated with another subband of the SBFD time unit. The other subband has a link direction different from the subband.

[00155] In some embodiments, the first network device 130 obtains the configuration by at least one of: receiving the configuration from a second network device; receiving the configuration via an authentication management function (AMF) function; or determining, at the first network device, the configuration.

[00156] In some embodiments, the first network device 130 further transmits a measurement report comprising the CLI size to a second network device.

[00157] In some embodiments, the first network device 130 further transmits, to a first terminal device 110, a first density indication of a sounding reference signal (SRS), the first density indication being indicative of a first density and a second density, the first density being higher than the second density, and wherein the first density is associated with a first portion of the subband and the second density is associated with a second portion of the subband, the first potion being closer to a boundary between the subband and the other subband than the second portion.

[00158] In some embodiments, the first network device 130 further transmits, to the second network device, a power indication, the power indication being indicative of a first power and a second power, the first power being lower than the second power, and wherein the first power is associated with a first portion of the subband and the second power is associated with a second portion of the subband, the first portion being closer to a boundary between the subband and the other subband than the second portion.

[00159] Fig. 10 illustrates a flowchart of a method 1000 of communication implemented at a network device in accordance with some embodiments of the present disclosure. The

method 1000 can be implemented at the second network device 140 shown in Fig. 1. For the purpose of discussion, the method 1000 will be described with reference to Fig. 1. It is to be understood that the method 1000 may include additional acts not shown and/or may omit some shown acts, and the scope of the present disclosure is not limited in this regard.

[00160] At 1010, the second network device 140 obtains a configuration indicating a set of resources within a subband of a subband non-overlapping full duplex (SBFD) time unit that comprises subbands not overlapped with each other. At 1020, the second network device 140 transmits, to a first network device 130, an inter-subband cross link interference-reference signal (CLI-RS) on another subband of the SBFD time unit. The other subband has a link direction different from the subband.

[00161] In some embodiments, the second network 140 device obtains the configuration by at least one of: receiving the configuration from a first network device; receiving the configuration via a authentication management function (AMF) function; or determining, at the second network device, the configuration.

[00162] In some embodiments, the second network device 140 further receives a measurement report comprising the CLI size to a second network device.

[00163] In some embodiments, the second network device 140 further receives, from a first network device, a power indication, the power indication being indicative of a first power and a second power, the first power being lower than the second power, and wherein the first power is associated with a first portion of the subband and the second power is associated with a second portion of the subband, the first portion being closer to a boundary between the subband and the other subband than the second portion.

[00164] Fig. 11 is a simplified block diagram of a device 1100 that is suitable for implementing some embodiments of the present disclosure. The device 1100 can be considered as a further example embodiment of the terminal devices 110, 120, 150 or network devices 130 and 140 as shown in FIG. 1. Accordingly, the device 1100 can be implemented at or as at least a part of the above network devices or terminal devices.

[00165] As shown, the device 1100 includes a processor 1110, a memory 1120 coupled to the processor 1110, a suitable transmitter (TX) and receiver (RX) 1140 coupled to the processor 1110, and a communication interface coupled to the TX/RX 1140. The memory 1120 stores at least a part of a program 1130. The TX/RX 1140 is for bidirectional communications. The TX/RX 1140 has at least one antenna to facilitate communication,

though in practice an Access Node mentioned in this application may have several ones. The communication interface may represent any interface that is necessary for communication with other network elements, such as X2 interface for bidirectional communications between gNBs or eNBs, S1 interface for communication between a Mobility Management Entity (MME)/Serving Gateway (S-GW) and the gNB or eNB, Un interface for communication between the gNB or eNB and a relay node (RN), or Uu interface for communication between the gNB or eNB and a terminal device.

[00166] The program 1130 is assumed to include program instructions that, when executed by the associated processor 1110, enable the device 1100 to operate in accordance with the embodiments of the present disclosure, as discussed herein with reference to FIGs. 1-16. The embodiments herein may be implemented by computer software executable by the processor 1110 of the device 1100, or by hardware, or by a combination of software and hardware. The processor 1110 may be configured to implement various embodiments of the present disclosure. Furthermore, a combination of the processor 1110 and memory 1120 may form processing means 1150 adapted to implement various embodiments of the present disclosure.

[00167] The memory 1120 may be of any type suitable to the local technical network and may be implemented using any suitable data storage technology, such as a non-transitory computer readable storage medium, semiconductor based memory devices, magnetic memory devices and systems, optical memory devices and systems, fixed memory and removable memory, as non-limiting examples. While only one memory 1120 is shown in the device 1100, there may be several physically distinct memory modules in the device 1100. The processor 1110 may be of any type suitable to the local technical network, and may include one or more of general purpose computers, special purpose computers, microprocessors, digital signal processors (DSPs) and processors based on multicore processor architecture, as non-limiting examples. The device 1100 may have multiple processors, such as an application specific integrated circuit chip that is slaved in time to a clock which synchronizes the main processor.

[00168] In some embodiments, a terminal device comprises circuitry configured to perform method 600 or 800.

[00169] In some embodiments, a network device comprises circuitry configured to perform method 700, 900 or 1000.

[00170] The components included in the apparatuses and/or devices of the present disclosure may be implemented in various manners, including software, hardware, firmware, or any combination thereof. In one embodiment, one or more units may be implemented using software and/or firmware, for example, machine-executable instructions stored on the storage medium. In addition to or instead of machine-executable instructions, parts or all of the units in the apparatuses and/or devices may be implemented, at least in part, by one or more hardware logic components. For example, and without limitation, illustrative types of hardware logic components that can be used include Field-programmable Gate Arrays (FPGAs), Application-specific Integrated Circuits (ASICs), Application-specific Standard Products (ASSPs), System-on-a-chip systems (SOCs), Complex Programmable Logic Devices (CPLDs), and the like.

[00171] Generally, various embodiments of the present disclosure may be implemented in hardware or special purpose circuits, software, logic or any combination thereof. Some aspects may be implemented in hardware, while other aspects may be implemented in firmware or software which may be executed by a controller, microprocessor or other computing device. While various aspects of embodiments of the present disclosure are illustrated and described as block diagrams, flowcharts, or using some other pictorial representation, it will be appreciated that the blocks, apparatus, systems, technique terminal devices or methods described herein may be implemented in, as non-limiting examples, hardware, software, firmware, special purpose circuits or logic, general purpose hardware or controller or other computing devices, or some combination thereof.

[00172] The present disclosure also provides at least one computer program product tangibly stored on a non-transitory computer readable storage medium. The computer program product includes computer-executable instructions, such as those included in program modules, being executed in a device on a target real or virtual processor, to carry out the process or method as described above with reference to any of Figs. 2 to 10. Generally, program modules include routines, programs, libraries, objects, classes, components, data structures, or the like that perform particular tasks or implement particular abstract data types. The functionality of the program modules may be combined or split between program modules as desired in various embodiments. Machine-executable instructions for program modules may be executed within a local or distributed device. In a distributed device, program modules may be located in both local and remote storage media.

[00173] Program code for carrying out methods of the present disclosure may be written in any combination of one or more programming languages. These program codes may be provided to a processor or controller of a general purpose computer, special purpose computer, or other programmable data processing apparatus, such that the program codes, when executed by the processor or controller, cause the functions/operations specified in the flowcharts and/or block diagrams to be implemented. The program code may execute entirely on a machine, partly on the machine, as a stand-alone software package, partly on the machine and partly on a remote machine or entirely on the remote machine or server.

[00174] The above program code may be embodied on a machine readable medium, which may be any tangible medium that may contain, or store a program for use by or in connection with an instruction execution system, apparatus, or device. The machine readable medium may be a machine readable signal medium or a machine readable storage medium. A machine readable medium may include but not limited to an electronic, magnetic, optical, electromagnetic, infrared, or semiconductor system, apparatus, or device, or any suitable combination of the foregoing. More specific examples of the machine readable storage medium would include an electrical connection having one or more wires, a portable computer diskette, a hard disk, a random access memory (RAM), a read-only memory (ROM), an erasable programmable read-only memory (EPROM or Flash memory), an optical fiber, a portable compact disc read-only memory (CD-ROM), an optical storage device, a magnetic storage device, or any suitable combination of the foregoing.

[00175] Further, while operations are depicted in a particular order, this should not be understood as requiring that such operations be performed in the particular order shown or in sequential order, or that all illustrated operations be performed, to achieve desirable results. In certain circumstances, multitasking and parallel processing may be advantageous. Likewise, while several specific embodiment details are contained in the above discussions, these should not be construed as limitations on the scope of the present disclosure, but rather as descriptions of features that may be specific to particular embodiments. Certain features that are described in the context of separate embodiments may also be implemented in combination in a single embodiment. Conversely, various features that are described in the context of a single embodiment may also be implemented in multiple embodiments separately or in any suitable sub-combination.

[00176] Although the present disclosure has been described in language specific to structural features and/or methodological acts, it is to be understood that the present

disclosure defined in the appended claims is not necessarily limited to the specific features or acts described above. Rather, the specific features and acts described above are disclosed as example forms of implementing the claims.

[00177] In summary, embodiments of the present disclosure may provide the following solutions.

[00178] A first terminal device comprises a transceiver and a processor communicatively coupled to the transceiver. The processor is configured to cause the first terminal device to: receive, from a network device, a configuration indicating a set of resources within a subband of a subband non-overlapping full duplex (SBFD) time unit that comprises subbands not overlapped with each other; measure, on the set of resources, an inter-subband cross link interference (CLI) size associated with another subband of the SBFD time unit, the other subband having a link direction different from the subband; and transmit, to the network device, a measurement report comprising the CLI size.

[00179] In one embodiment, wherein the other subband is a neighboring subband of the subband, and wherein the CLI size comprises at least one of: a received signal strength indicator (RSSI); or a CLI level that is determined based on the RSSI.

[00180] In one embodiment, wherein the configuration is a common measurement configuration for measuring the inter-subband CLI size and an intra-subband CLI size in the subband, the inter-CLI in the subband is caused by a signal transmitted on the other subband, and the intra-subband CLI in the subband is caused by another signal transmitted on a frequency band that at least partially overlaps with the first subband.

[00181] In one embodiment, wherein the configuration comprises a measurement type indication for the CLI.

[00182] In one embodiment, wherein the first subband is one of a plurality of subbands in the SBFD time unit, wherein the plurality of subbands has the same frequency bandwidth and the same link direction, and wherein the first terminal device is further caused to: determine a respective set of resources in each of the plurality of subbands based on the set of resource; measure a respective CLI size on the respective set of resources; and transmit the measurement report comprising the respective CLI size.

[00183] In one embodiment, wherein the configuration comprises a CLI measurement subband enabling field indicating at least one of the plurality of subbands, and wherein the first terminal device is caused to determine the respective set of resources by: determining

the respective set of resources in the at least one subband.

[00184] In one embodiment, wherein the configuration is dedicated to measuring the inter-subband CLI, and wherein the configuration indicates at least one inter-subband CLI resource, and the at least one inter-subband CLI resource being indicated by at least one of: a transmission configuration indication (TCI) state identification (ID); a starting physical resource block (PRB) index; an ending PRB index; a number of PRBs; a sub-carrier spacing (SCS); or measuring periodicity and offset.

[00185] In one embodiment, wherein the configuration indicates the set of resources that comprises a plurality of resource subsets.

[00186] In one embodiment, wherein the configuration further indicates a number of resource blocks shared among the plurality of resource subsets, and wherein the CLI measurement report comprises a CLI size measured in a resource subset of the plurality of resource subsets.

[00187] In one embodiment, wherein the configuration individually indicate each of the plurality of resource subsets, and wherein the CLI measurement report comprises a CLI size measured in a resource subset of the plurality of resource subsets.

[00188] In one embodiment, wherein the measurement report comprises a CLI size for a resource subset of the plurality of resource subsets and at least one CLI offset value for at least one another resource subset of the plurality of resource subsets.

[00189] In one embodiment, wherein the CLI size measured in the resource subset is above a first CLI threshold.

[00190] In one embodiment, wherein a reporting identification (ID) of the measurement report is associated with at least one of an ID of the configuration or another ID of each of the plurality of resource subsets.

[00191] In one embodiment, wherein the measurement report comprises a CLI level matrix, and wherein an element in the CLI level matrix is associated with a respective resource subset of the plurality of resource subsets and the SBFD time unit, and wherein the element is determined based on a RSSI.

[00192] In one embodiment, wherein at least one of: the measurement report is transmitted based on the CLI size being above a second CLI threshold; or the measurement report is transmitted periodically.

[00193] In one embodiment, wherein the first terminal device is further caused to: receive, from the network device, a first density indication of a channel state information-reference signal (CSI-RS), the first density indication being indicative of a first density and a second density, the first density being higher than the second density, and wherein the first density is associated with a first portion of the subband and the second density is associated with a second portion of the subband, the first potion being closer to a boundary between the subband and the other subband than the second portion.

[00194] In one embodiment, wherein the first terminal device is further caused to: receive, from the network device, an order indication of a modulation and coding scheme (MCS), the order indication being indicative of a first order and a second order, the first order being lower than the second order, and wherein the first order is associated with a first portion of the subband and the second order is associated with a second portion of the subband, the first portion being closer to a boundary between the subband and the other subband than the second portion.

[00195] In one embodiment, wherein the first terminal device is further caused to: receive, from the network device, a second density indication of a demodulation reference signal (DMRS), the second density indication being indicative of a third density and a fourth density, the third density type being higher than the fourth density, and wherein the third density is associated with a first portion of the subband and the fourth density is associated with a second portion of the subband, the first portion being closer to a boundary between the subband and the other subband than the second portion.

[00196] A network device comprises a transceiver and a processor communicatively coupled to the transceiver. The processor is configured to cause the network device to: transmit, to at least one of a first terminal device and a second terminal device, a configuration indicating a set of resources within a subband of a subband non-overlapping full duplex (SBFD) time unit that comprises subbands not overlapped with each other; and receive, from the first terminal device, a measurement report comprising an inter-subband cross link interference (CLI) size in the subband, the CLI size being associated with another subband of the SBFD time unit, the other subband having a link direction different from the subband.

[00197] In one embodiment, wherein the other subband is a neighboring subband of the subband, and wherein the CLI size comprises at least one of: a received signal strength

indicator (RSSI); or a CLI level that is determined based on the RSSI.

[00198] In one embodiment, wherein: the configuration is a common measurement configuration for measuring the inter-subband CLI size and an intra-subband CLI size in the subband, the inter-CLI in the subband is caused by a signal transmitted on the other subband, and the intra-subband CLI in the subband is caused by another signal transmitted on a frequency band that at least partially overlaps with the first subband.

[00199] In one embodiment, wherein the configuration comprises a measurement type indication for the CLI.

[00200] In one embodiment, wherein the configuration comprises a CLI measurement subband enabling field indicating at least one of the plurality of subbands.

[00201] In one embodiment, wherein the configuration is dedicated to measuring the inter-subband CLI, and wherein the configuration indicates at least one inter-subband CLI resource, and the at least one inter-subband CLI resource being indicated by at least one of: a transmission configuration indication (TCI) state identification (ID); a starting physical resource block (PRB) index; a ending PRB index; a number of PRBs; a sub-carrier spacing (SCS); or measuring periodicity and offset.

[00202] In one embodiment, wherein the configuration indicates the set of resources that comprises a plurality of resource subsets.

[00203] In one embodiment, wherein the configuration further indicates a number of resource blocks shared among the plurality of resource subsets, and wherein the CLI measurement report comprises a CLI size measured in a resource subset of the plurality of resource subsets.

[00204] In one embodiment, wherein the configuration individually indicate each of the plurality of resource subsets, and wherein the CLI measurement report comprises a CLI size measured in a resource subset of the plurality of resource subsets.

[00205] In one embodiment, wherein the measurement report comprises a CLI size for a resource subset of the plurality of resource subsets and at least one CLI offset value for at least one another resource subset of the plurality of resource subsets.

[00206] In one embodiment, wherein the CLI size measured in the resource subset is above a first CLI threshold.

[00207] In one embodiment, wherein a reporting identification (ID) of the measurement

report is associated with an ID of each of the plurality of resource subsets.

[00208] In one embodiment, wherein the measurement report comprises a CLI level matrix, and wherein an element in the CLI level matrix is associated with a respective resource subset of the plurality of resource subsets and the SBFD time unit, and wherein the element is determined based on a RSSI.

[00209] In one embodiment, wherein at least one of: the measurement report is transmitted based on the CLI size is above a second CLI threshold; or the measurement report is transmitted periodically.

[00210] In one embodiment, wherein the network device is further caused to: transmit, to the first terminal device, a first density indication of a channel state information reference signal (CSI-RS), the first density indication being indicative of a first density and a second density, the first density being higher than the second density, and wherein the first density is associated with a first portion of the subband and the second density is associated with a second portion of the subband, the first potion being closer to a boundary between the subband and the other subband than the second portion.

[00211] In one embodiment, wherein the network device is further caused to: transmit, to the first terminal device, an order indication of a modulation and coding scheme (MCS), the order indication being indicative of a first order and a second order, the first order being lower than the second order, and wherein the first order is associated with a first portion of the subband and the second order is associated with a second portion of the subband, the first portion being closer to a boundary between the subband and the other subband than the second portion.

[00212] In one embodiment, wherein the network device is further caused to: transmit, to the first terminal device, a second density indication of a demodulation reference signal (DMRS), the second density indication being indicative of a first density type and a second density type, the first density type being higher than the second density type, and wherein the first type is associated with a first portion of the subband and the second type is associated with a second portion of the subband, the first portion being closer to a boundary between the subband and the other subband than the second portion.

[00213] In one embodiment, wherein the network device is further caused to: transmit, to the second device that causes the CLI in the subband, a power indication, the power indication being indicative of a first power and a second power, the first power being lower

than the second power, and wherein the first power is associated with a first portion of the subband and the second power is associated with a second portion of the subband, the first portion being closer to a boundary between the subband and the other subband than the second portion.

[00214] A second terminal device comprises a transceiver and a processor communicatively coupled to the transceiver. The processor is configured to cause the first second device to: receive, from a network device, a configuration indicating a set of resources within a subband of a subband non-overlapping full duplex (SBFD) time unit that comprises subbands not overlapped with each other; and transmit, to a first terminal device, an inter-subband cross link interference-reference signal (CLI-RS) on another subband of the SBFD time unit, the other subband having a link direction different from the subband.

[00215] In one embodiment, wherein the second terminal device is further caused to: receive, from the network device, a power indication, the power indication being indicative of a first power and a second power, the first power being lower than the second power, and wherein the first power is associated with a first portion of the subband and the second power is associated with a second portion of the subband, the first portion being closer to a boundary between the subband and the other subband than the second portion.

[00216] A first network device comprises a transceiver and a processor communicatively coupled to the transceiver. The processor is configured to cause the first network device to: obtain a configuration indicating a set of resources within a subband of a subband non-overlapping full duplex (SBFD) time unit that comprises subbands not overlapped with each other; and measure, on the set of resources, an inter-subband cross link interference (CLI) size associated with another subband of the SBFD time unit, the other subband having a link direction different from the subband.

[00217] In one embodiment, wherein the first network device is caused to obtain the configuration by at least one of: receiving the configuration from a second network device; receiving the configuration via a authentication management function (AMF) function; or determining, at the first network device, the configuration.

[00218] In one embodiment, wherein the first network device is further caused to transmit a measurement report comprising the CLI size to a second network device.

[00219] In one embodiment, wherein the first network device is further caused to: transmit, to a first terminal device, a first density indication of a sounding reference signal (SRS), the

first density indication being indicative of a first density and a second density, the first density being higher than the second density, and wherein the first density is associated with a first portion of the subband and the second density is associated with a second portion of the subband, the first potion being closer to a boundary between the subband and the other subband than the second portion.

[00220] In one embodiment, wherein the first network device is further caused to: transmit, to the second network device, a power indication, the power indication being indicative of a first power and a second power, the first power being lower than the second power, and wherein the first power is associated with a first portion of the subband and the second power is associated with a second portion of the subband, the first portion being closer to a boundary between the subband and the other subband than the second portion.

[00221] A second network device comprises a transceiver and a processor communicatively coupled to the transceiver. The processor is configured to cause the second network device to: obtain a configuration indicating a set of resources within a subband of a subband non-overlapping full duplex (SBFD) time unit that comprises subbands not overlapped with each other; and transmit, to a first network device, an inter-subband cross link interference-reference signal (CLI-RS) on another subband of the SBFD time unit, the other subband having a link direction different from the subband.

[00222] In one embodiment, wherein the second network device is caused to obtain the configuration by at least one of: receiving the configuration from a first network device; receiving the configuration via a authentication management function (AMF) function; or determining, at the second network device, the configuration.

[00223] In one embodiment, wherein the second network device is further caused to receive a measurement report comprising the CLI size to a second network device.

[00224] In one embodiment, wherein the second network device is further caused to: receive, from a first network device, a power indication, the power indication being indicative of a first power and a second power, the first power being lower than the second power, and wherein the first power is associated with a first portion of the subband and the second power is associated with a second portion of the subband, the first portion being closer to a boundary between the subband and the other subband than the second portion.

[00225] A method of communication, comprising: receiving, at a first terminal device and from a network device, a configuration indicating a set of resources within a subband of a

subband non-overlapping full duplex (SBFD) time unit that comprises subbands not overlapped with each other; measuring, on the set of resources, an inter-subband cross link interference (CLI) size associated with another subband of the SBFD time unit, the other subband having a link direction different from the subband; and transmitting, to the network device, a measurement report comprising the CLI size.

[00226] A method of communication, comprising: transmitting, at a network device and to at least one of a first terminal device and a second terminal device, a configuration indicating a set of resources within a subband of a subband non-overlapping full duplex (SBFD) time unit that comprises subbands not overlapped with each other; and receiving, from the first terminal device, a measurement report comprising an inter-subband cross link interference (CLI) size in the subband, the CLI size being associated with another subband of the SBFD time unit, the other subband having a link direction different from the subband.

[00227] A method of communication, comprising: receiving, at a second terminal device and from a network device, a configuration indicating a set of resources within a subband of a subband non-overlapping full duplex (SBFD) time unit that comprises subbands not overlapped with each other; and transmitting, to a first terminal device, an inter-subband cross link interference-reference signal (CLI-RS) on another subband of the SBFD time unit, the other subband having a link direction different from the subband.

[00228] A method of communication, comprising: obtaining, at a first network device, a configuration indicating a set of resources within a subband of a subband non-overlapping full duplex (SBFD) time unit that comprises subbands not overlapped with each other; measure, on the set of resources, an inter-subband cross link interference (CLI) size associated with another subband of the SBFD time unit, the other subband having a link direction different from the subband.

[00229] A method of communication, comprising: obtaining a configuration indicating a set of resources within a subband of a subband non-overlapping full duplex (SBFD) time unit that comprises subbands not overlapped with each other; and transmitting, to a first network device, an inter-subband cross link interference-reference signal (CLI-RS) on another subband of the SBFD time unit, the other subband having a link direction different from the subband.

[00230] A computer readable medium having instructions stored thereon, the instructions,

when executed on at least one processor, causing the at least one processor to perform the above method.

WHAT IS CLAIMED IS:

1. A first terminal device comprising:

a transceiver; and

a processor communicatively coupled to the transceiver, and the processor is configured to cause the first terminal device to:

receive, from a network device, a configuration indicating a set of resources within a subband of a subband non-overlapping full duplex (SBFD) time unit that comprises subbands not overlapped with each other;

measure, on the set of resources, an inter-subband cross link interference (CLI) size associated with another subband of the SBFD time unit, the other subband having a link direction different from the subband; and

transmit, to the network device, a measurement report comprising the CLI size.

2. The first terminal device of claim 1, wherein the other subband is a neighboring subband of the subband, and wherein the CLI size comprises at least one of:

a received signal strength indicator (RSSI); or

a CLI level that is determined based on the RSSI.

3. The first terminal device of claim 1 or 2, wherein:

the configuration is a common measurement configuration for measuring the inter-subband CLI size and an intra-subband CLI size in the subband,

the inter-CLI in the subband is caused by a signal transmitted on the other subband, and

the intra-subband CLI in the subband is caused by another signal transmitted on a frequency band that at least partially overlaps with the first subband.

4. The first terminal device of claim 3, wherein the configuration comprises a measurement type indication for the CLI.

5. The first terminal device of claim 3 or 4, wherein the first subband is one of a plurality of subbands in the SBFD time unit, wherein the plurality of subbands has the same frequency bandwidth and the same link direction, and wherein the first terminal device is further caused to:

determine a respective set of resources in each of the plurality of subbands based on the set of resource;

measure a respective CLI size on the respective set of resources; and

transmit the measurement report comprising the respective CLI size.

6. The first terminal device of claim 5, wherein the configuration comprises a CLI measurement subband enabling field indicating at least one of the plurality of subbands, and wherein the first terminal device is caused to determine the respective set of resources by:

determining the respective set of resources in the at least one subband.

7. The first terminal device of any of claims 1 to 6, wherein the configuration is dedicated to measuring the inter-subband CLI, and wherein the configuration indicates at least one inter-subband CLI resource, and the at least one inter-subband CLI resource being indicated by at least one of:

a transmission configuration indication (TCI) state identification (ID);

a starting physical resource block (PRB) index;

an ending PRB index;

a number of PRBs;

a sub-carrier spacing (SCS); or

measuring periodicity and offset.

8. The first terminal device of any of claims 1 to 7, wherein the configuration indicates the set of resources that comprises a plurality of resource subsets.

9. The first terminal device of claim 8, wherein the configuration further indicates a number of resource blocks shared among the plurality of resource subsets, and wherein the CLI measurement report comprises a CLI size measured in a resource subset of the plurality of resource subsets.

10. The first terminal device of claim 8, wherein the configuration individually indicate each of the plurality of resource subsets, and wherein the CLI measurement report comprises a CLI size measured in a resource subset of the plurality of resource subsets.

11. The first terminal device of claim 9 or 10, wherein the measurement report comprises a CLI size for a resource subset of the plurality of resource subsets and at least one CLI offset value for at least one another resource subset of the plurality of resource subsets.

12. The first terminal device of claim 9 or 10, wherein the CLI size measured in the resource subset is above a first CLI threshold.

13. The first terminal device of claim 9 or 10, wherein a reporting identification (ID) of the measurement report is associated with at least one of an ID of the configuration or another ID of each of the plurality of resource subsets.

14. The first terminal device of claim 9 or 10, wherein the measurement report comprises a CLI level matrix, and wherein an element in the CLI level matrix is associated with a respective resource subset of the plurality of resource subsets and the SBFD time unit, and wherein the element is determined based on a RSSI.

15. The first terminal device of claim 1, wherein at least one of:

the measurement report is transmitted based on the CLI size being above a second CLI threshold; or

the measurement report is transmitted periodically.

16. The first terminal device of claim 1, wherein the first terminal device is further caused to:

receive, from the network device, a first density indication of a channel state information-reference signal (CSI-RS), the first density indication being indicative of a first density and a second density, the first density being higher than the second density, and

wherein the first density is associated with a first portion of the subband and the second density is associated with a second portion of the subband, the first potion being closer to a boundary between the subband and the other subband than the second portion.

17. The first terminal device of claim 1, wherein the first terminal device is further caused to:

receive, from the network device, an order indication of a modulation and coding scheme (MCS), the order indication being indicative of a first order and a second order, the first order being lower than the second order, and

wherein the first order is associated with a first portion of the subband and the second order is associated with a second portion of the subband, the first portion being closer to a boundary between the subband and the other subband than the second portion.

18. The first terminal device of claim 1, wherein the first terminal device is further caused to:

receive, from the network device, a second density indication of a demodulation reference signal (DMRS), the second density indication being indicative of a third density and a fourth density, the third density type being higher than the fourth density, and

wherein the third density is associated with a first portion of the subband and the fourth density is associated with a second portion of the subband, the first portion being closer to a boundary between the subband and the other subband than the second portion.

19. A network device comprising:

a transceiver; and

a processor communicatively coupled to the transceiver, and the processor is configured to cause the network device to:

transmit, to at least one of a first terminal device and a second terminal device, a configuration indicating a set of resources within a subband of a subband non-overlapping full duplex (SBFD) time unit that comprises subbands not overlapped with each other; and

receive, from the first terminal device, a measurement report comprising an inter-subband cross link interference (CLI) size in the subband, the CLI size being

associated with another subband of the SBFD time unit, the other subband having a link direction different from the subband.

20. The network device of claim 19, wherein the other subband is a neighboring subband of the subband, and wherein the CLI size comprises at least one of:

a received signal strength indicator (RSSI); or

a CLI level that is determined based on the RSSI.

DRAWINGS

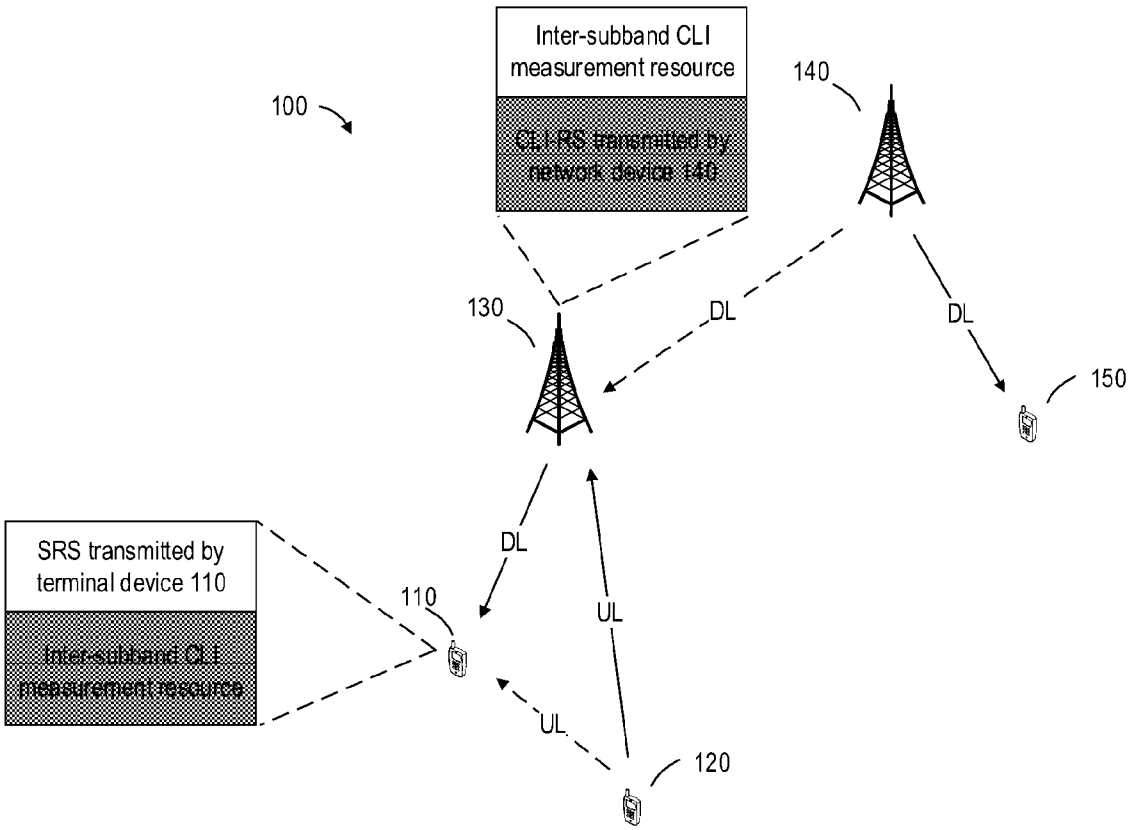


Fig. 1a

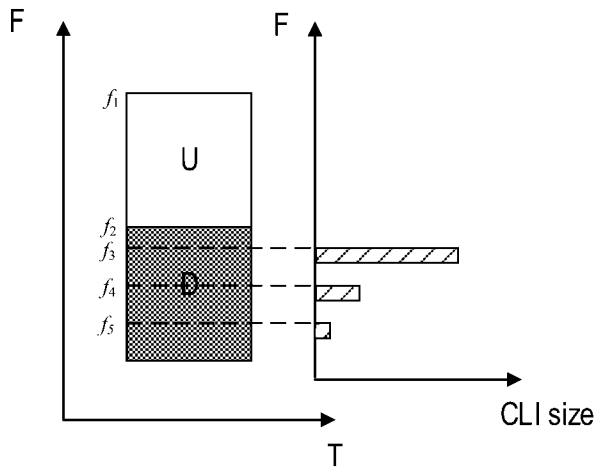

F
F
f_1
U
f_2
f_3
D
f_4
f_5
CLI size
T

Fig. 1b

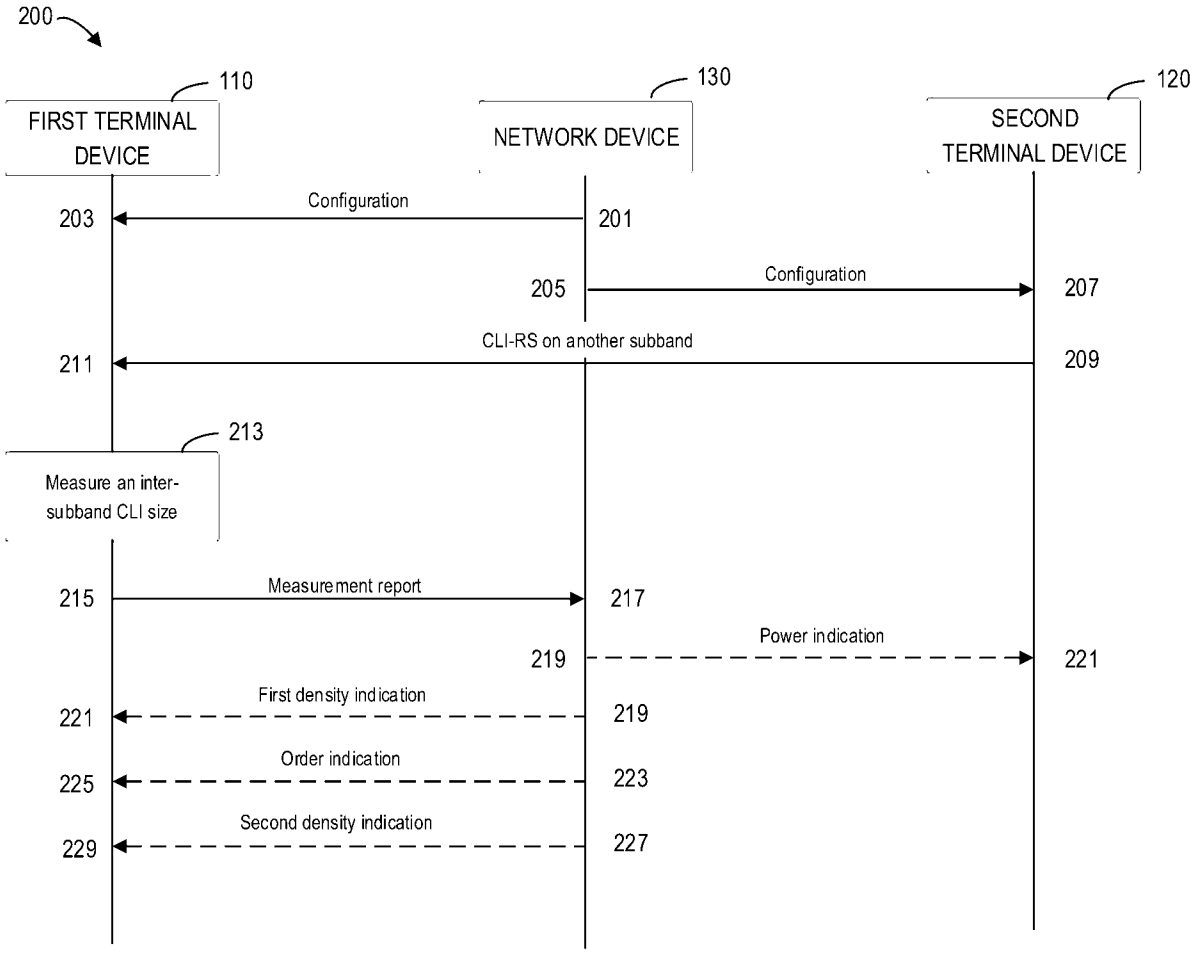

200
110
FIRST TERMINAL DEVICE
130
NETWORK DEVICE
120
SECOND TERMINAL DEVICE
Configuration
203
201
205
Configuration
207
CLI-RS on another subband
211
209
213
Measure an inter-subband CLI size
215
Measurement report
217
219
Power indication
221
First density indication
221
219
Order indication
225
223
Second density indication
229
227

FIG. 2

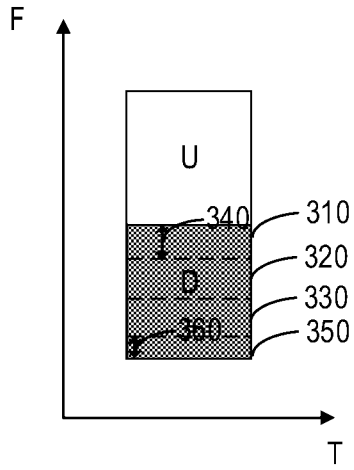


Fig. 3a

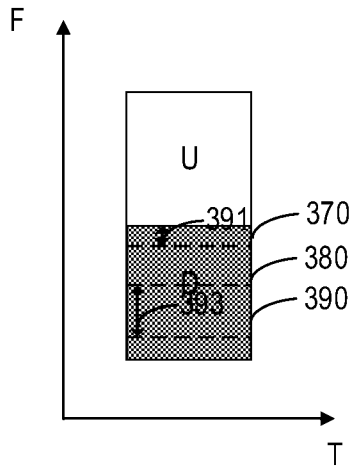


Fig. 3b

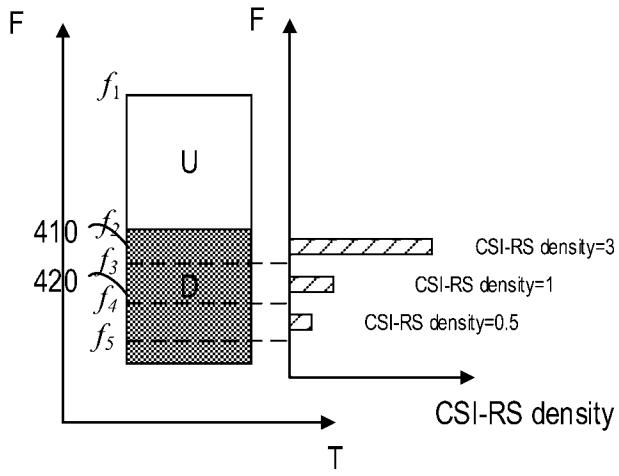


Fig. 4a

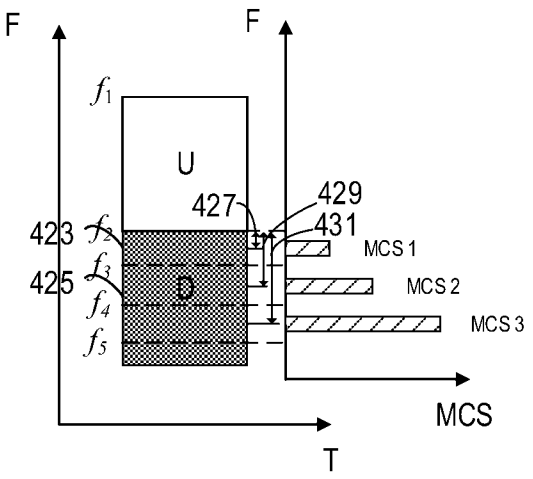


Fig. 4b

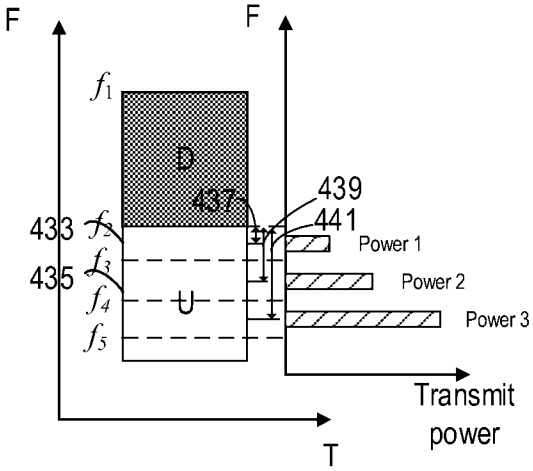


Fig. 4c

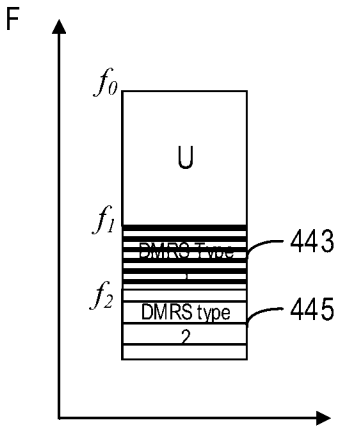


Fig. 4d

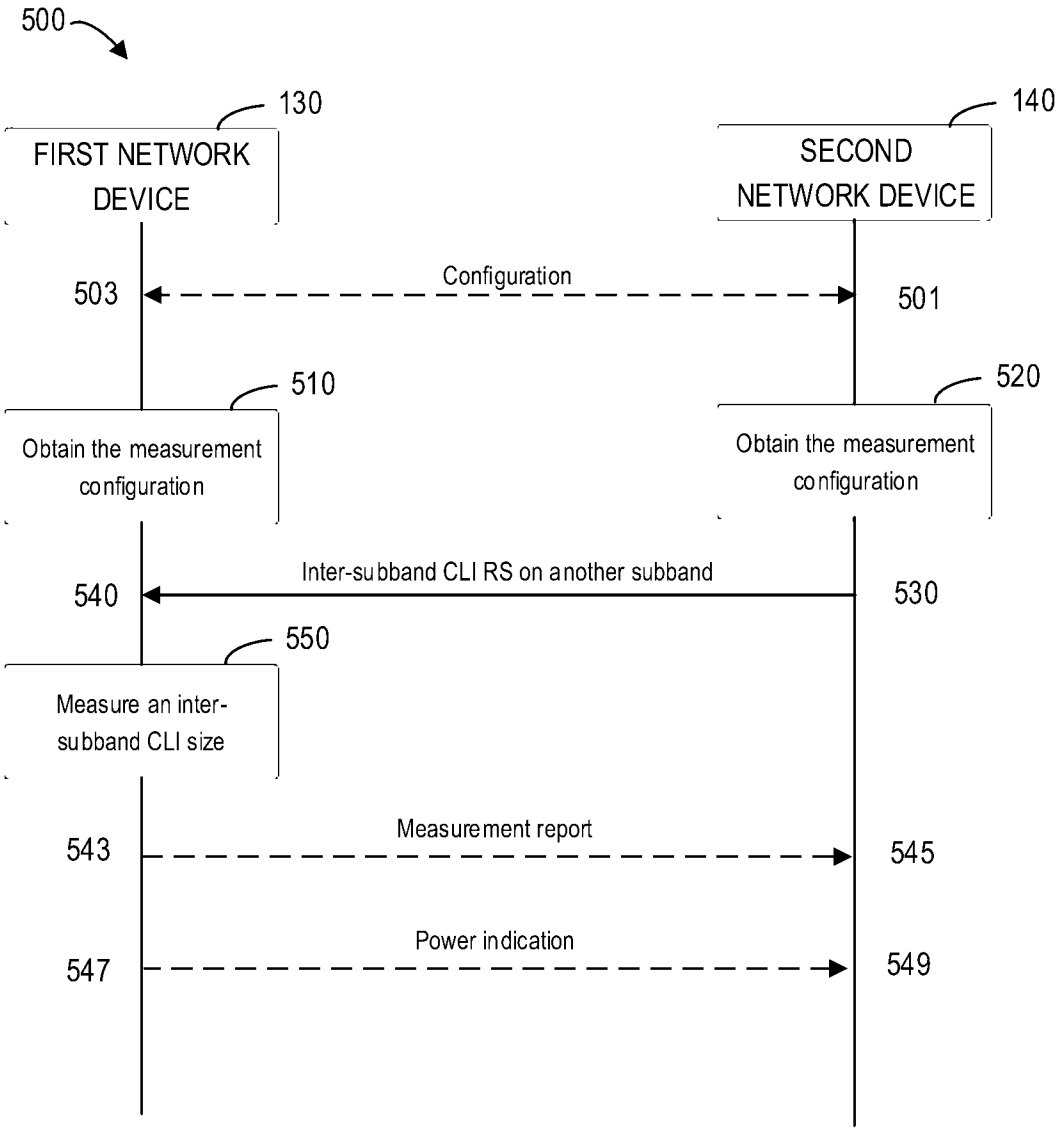

500
130
FIRST NETWORK DEVICE
140
SECOND NETWORK DEVICE
503
Configuration
501
510
Obtain the measurement configuration
520
Obtain the measurement configuration
540
Inter-subband CLI RS on another subband
530
550
Measure an inter-subband CLI size
543
Measurement report
545
547
Power indication
549

FIG. 5

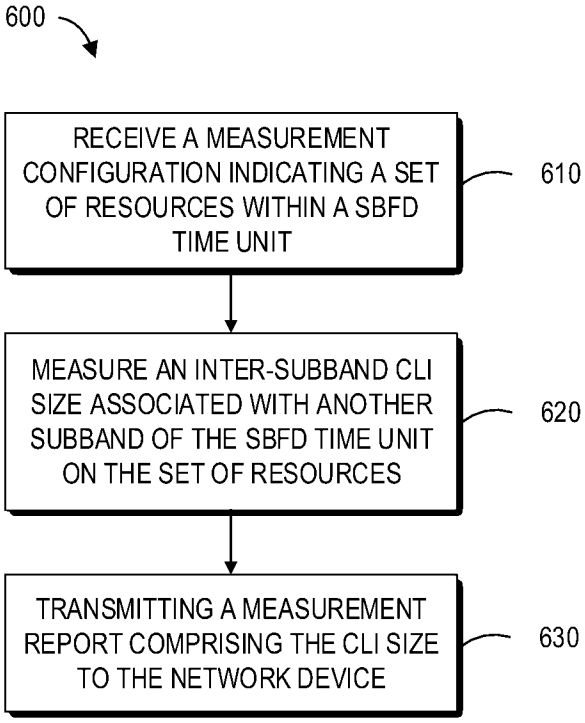

600
RECEIVE A MEASUREMENT CONFIGURATION INDICATING A SET OF RESOURCES WITHIN A SBFD TIME UNIT
610
MEASURE AN INTER-SUBBAND CLI SIZE ASSOCIATED WITH ANOTHER SUBBAND OF THE SBFD TIME UNIT ON THE SET OF RESOURCES
620
TRANSMITTING A MEASUREMENT REPORT COMPRISING THE CLI SIZE TO THE NETWORK DEVICE
630

FIG. 6

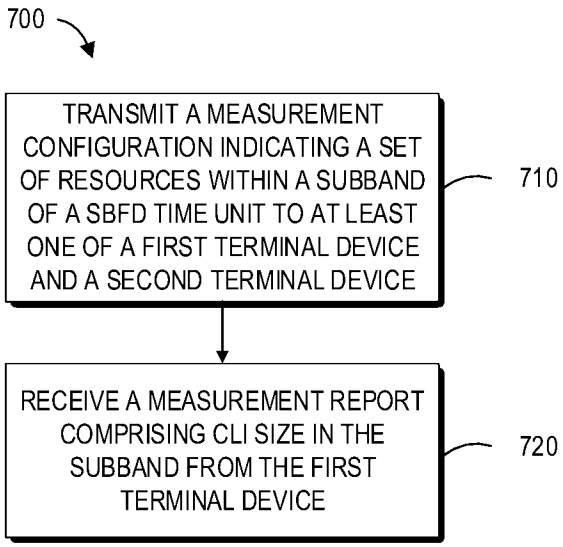

700
TRANSMIT A MEASUREMENT CONFIGURATION INDICATING A SET OF RESOURCES WITHIN A SUBBAND OF A SBFD TIME UNIT TO AT LEAST ONE OF A FIRST TERMINAL DEVICE AND A SECOND TERMINAL DEVICE
710
RECEIVE A MEASUREMENT REPORT COMPRISING CLI SIZE IN THE SUBBAND FROM THE FIRST TERMINAL DEVICE
720

Fig. 7

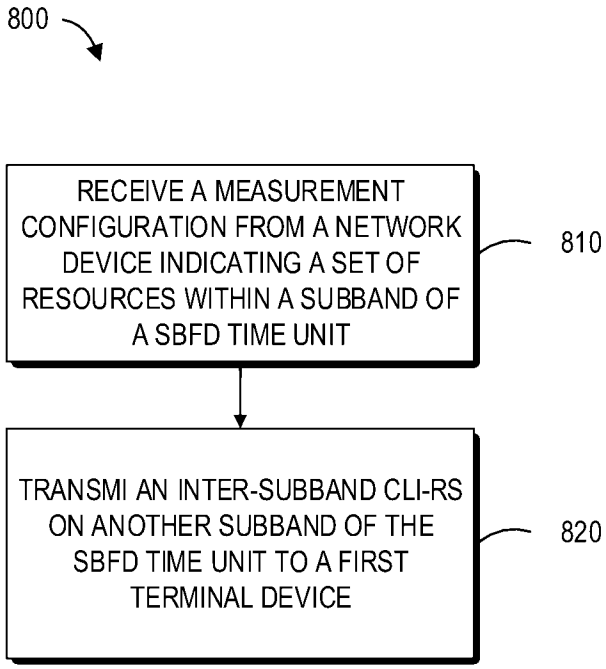

800
RECEIVE A MEASUREMENT CONFIGURATION FROM A NETWORK DEVICE INDICATING A SET OF RESOURCES WITHIN A SUBBAND OF A SBFD TIME UNIT
810
TRANSMI AN INTER-SUBBAND CLI-RS ON ANOTHER SUBBAND OF THE SBFD TIME UNIT TO A FIRST TERMINAL DEVICE
820

Fig. 8

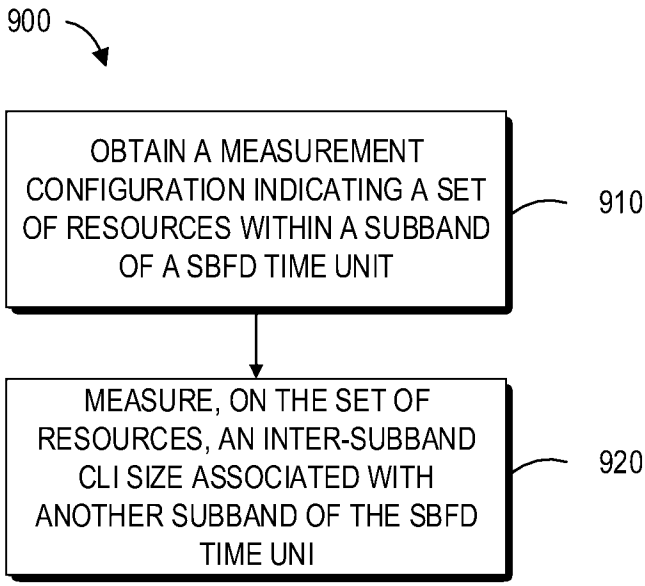

900
OBTAIN A MEASUREMENT CONFIGURATION INDICATING A SET OF RESOURCES WITHIN A SUBBAND OF A SBFD TIME UNIT
910
MEASURE, ON THE SET OF RESOURCES, AN INTER-SUBBAND CLI SIZE ASSOCIATED WITH ANOTHER SUBBAND OF THE SBFD TIME UNI
920

Fig. 9

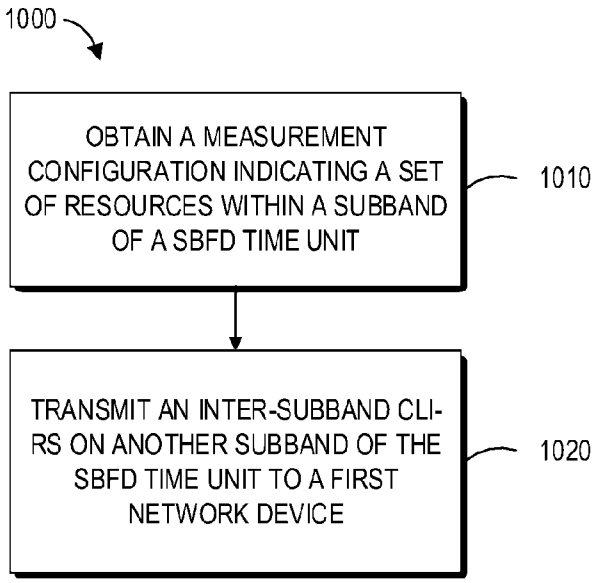

1000
OBTAIN A MEASUREMENT CONFIGURATION INDICATING A SET OF RESOURCES WITHIN A SUBBAND OF A SBFD TIME UNIT
1010
TRANSMIT AN INTER-SUBBAND CLI-RS ON ANOTHER SUBBAND OF THE SBFD TIME UNIT TO A FIRST NETWORK DEVICE
1020

Fig. 10

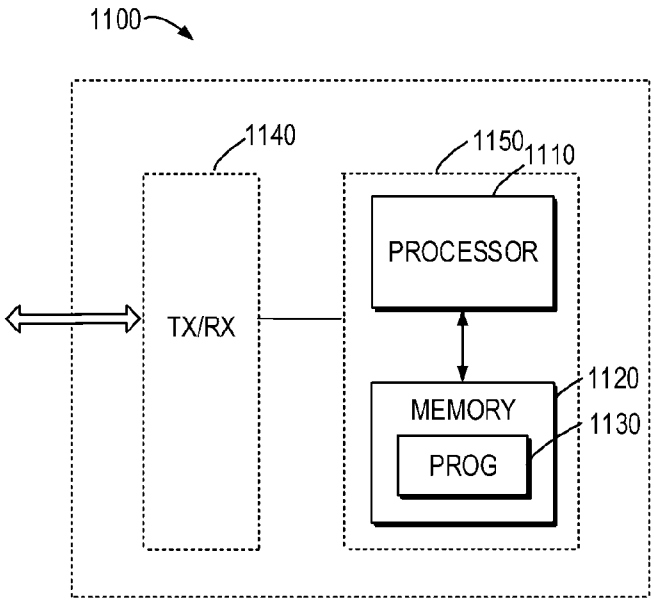

1100
1140
1150
1110
PROCESSOR
TX/RX
1120
MEMORY
1130
PROG

FIG. 11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2023/075756

A. CLASSIFICATION OF SUBJECT MATTER

H04W 24/02(2009.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: H04W H04L H04B

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

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

CNTXT,ENTXT,DWPI,CNKI,3GPP: non-overlapping, configuration, allocate, resource, subband, full, duplex, SBFD, time, unit, CLI, direction, different

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2022014954 A1 (QUALCOMM INCORPORATED) 13 January 2022 (2022-01-13) description, paragraphs [0071]-[0103], claims 1-30	1-20
A	CN 112237039 A (SHANGHAI NOKIA BELL CO., LTD. et al.) 15 January 2021 (2021-01-15) the whole document	1-20
A	US 2022140959 A1 (NOKIA TECHNOLOGIES OY) 05 May 2022 (2022-05-05) the whole document	1-20
A	QUALCOMM INCORPORATED. "Feasibility and techniques for Subband non-overlapping full duplex" *3GPP TSG RAN WG1 #109-e R1-2205031*, 20 May 2022 (2022-05-20), the whole document	1-20
A	MEDIATEK INC. "Discussion on subband non-overlapping full duplex for NR" *3GPP TSG RAN WG1 Meeting #109-e R1-2204722*, 20 May 2022 (2022-05-20), the whole document	1-20

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

☑ See patent family annex.

* Special categories of cited documents:

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

"D" document cited by the applicant in the international application

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

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

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
09 October 2023	**16 October 2023**

Name and mailing address of the ISA/CN	Authorized officer
CHINA NATIONAL INTELLECTUAL PROPERTY ADMINISTRATION **6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088, China**	**YANG,Dan** Telephone No. **(+86) 010-53961569**

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2023/075756

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
US 2022014954 A1	13 January 2022	WO 2022010572 A1	13 January 2022
		EP 4179657 A1	17 May 2023
		CN 115769522 A	07 March 2023
CN 112237039 A	15 January 2021	WO 2019232690 A1	12 December 2019
US 2022140959 A1	05 May 2022	WO 2020165210 A1	20 August 2020
		EP 3925139 A1	22 December 2021