US Patent & Trademark Office
Patent Public Search | Text View

United States Patent Application Publication 20250266886
Kind Code A1
Publication Date August 21, 2025
Inventor(s) YUAN; Jiangwei et al.

METHOD FOR DETERMINING TERMINAL RESOURCE OCCUPATION, COMMUNICATION DEVICE, AND STORAGE MEDIUM

Abstract

A method for determining terminal resource occupation, a communication device, and a storage medium are disclosed in the field of wireless communications. The method for determining terminal resource occupation of embodiments of this application includes: determining, by a communication device, terminal resource occupation according to a target rule related to target configuration information; where the target configuration information includes at least one of the following: a feedback configuration of the terminal for predicted channel state information CSI, and a feedback configuration of the terminal for time-domain CSI; and the target rule includes at least one of the following: a CSI processing unit CPU counting rule; a CPU occupancy time rule; an active resource counting rule; and an active port counting rule.

Inventors: **YUAN; Jiangwei (Dongguan, CN), WU; Hao (Dongguan, CN)**

Applicant: **VIVO MOBILE COMMUNICATION CO., LTD.** (Dongguan, CN)

Family ID: **1000008615771**

Appl. No.: **19/201204**

Filed: **May 07, 2025**

Foreign Application Priority Data

CN	202211392748.1	Nov. 08, 2022

Related U.S. Application Data

parent WO continuation PCT/CN2023/128625 20231031 PENDING child US 19201204

Publication Classification

Int. Cl.: **H04B7/06** (20060101); **H04W24/10** (20090101)

U.S. Cl.:

CPC **H04B7/0626** (20130101); **H04B7/0639** (20130101); **H04W24/10** (20130101);

Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS [0001] This application is a bypass continuation of International Application No. PCT/CN2023/128625, filed on Oct. 31, 2023, which claims the benefit of and priority to Chinese Patent Application No. 202211392748.1, filed on Nov. 8, 2022 and entitled “METHOD FOR DETERMINING TERMINAL RESOURCE OCCUPATION, COMMUNICATION DEVICE, AND STORAGE MEDIUM”, both of which are incorporated by reference in their entireties herein.

TECHNICAL FIELD
[0002] This application relates to the field of wireless communication technologies and, more specifically, relates to a method for determining terminal resource occupation, a communication device, and a storage medium.
BACKGROUND
[0003] In the related art, high-speed channel state information (CSI) enhancement is typically achieved through one of two primary schemes. In the first scheme, the terminal measures precoding matrix indicators (PMIs) across multiple time-domain units and feeds them back to the network, which then uses these measurements to predict PMIs for future time-domain units. In the second scheme, the terminal predicts the channel conditions of one or more future time-domain units based on channel information collected at multiple earlier moments, calculates the corresponding PMIs, and feeds them back to the network.
BRIEF SUMMARY
[0004] Embodiments of this application provide a method for determining terminal resource occupation, a communication device, and a storage medium.
[0005] According to a first aspect, a method for determining terminal resource occupation is provided and includes: determining, by a communication device, terminal resource occupation according to a target rule related to target configuration information; where the target configuration information includes at least one of the following: a feedback configuration of the terminal for predicted channel state information CSI, and a feedback configuration of the terminal for time-domain CSI; and the target rule includes at least one of the following: a CSI processing unit CPU counting rule; a CPU occupancy time rule; an active resource counting rule; and an active port counting rule.
[0006] According to a second aspect, an apparatus for determining terminal resource occupation is provided and includes: an obtaining module, configured to obtain a target rule related to target configuration information; where the target configuration information includes at least one of the following: a feedback configuration of the terminal for predicted channel state information CSI, and a feedback configuration of the terminal for time-domain CSI; and a determining module, configured to determine resource occupation by the terminal according to the target rule related to the target configuration information, where the target rule includes at least one of the following: a CSI processing unit CPU counting rule; a CPU occupancy time rule; an active resource counting rule; and an active port counting rule.

[0007] According to a third aspect, a communication device is provided, where the communication device includes a processor and a memory, and the memory stores a program or instructions capable of running on the processor, and when the program or instructions are executed by the processor, the steps of the method according to the first aspect are implemented.
[0008] According to a fourth aspect, a terminal is provided and includes a processor and a communication interface, where the processor is configured to implement the steps of the method according to the first aspect, and the communication interface is configured to communicate with external devices.
[0009] According to a fifth aspect, a readable storage medium is provided, where the readable storage medium stores a program or instructions, and when the program or instructions are executed by a processor, the steps of the method according to the first aspect are implemented.
[0010] According to a sixth aspect, a chip is provided, where the chip includes a processor and a communication interface, where the communication interface is coupled to the processor, and the processor is configured to run a program or instructions to implement the steps of the method according to the first aspect.
[0011] According to a seventh aspect, this application provides a computer program/program product, where the computer program/program product is stored in a storage medium, the computer program/program product is executed by at least one processor to implement the steps of the method according to the first aspect.

Description

BRIEF DESCRIPTION OF DRAWINGS
[0012] FIG. **1** is a block diagram of a wireless communication system to which the embodiments of this application may be applied;
[0013] FIG. **2** is a schematic flowchart of a method for determining terminal resource occupation according to an embodiment of this application;
[0014] FIG. **3** is a schematic structural diagram of an apparatus for determining terminal resource occupation according to an embodiment of this application;
[0015] FIG. **4** is a schematic structural diagram of a communication device according to an embodiment of this application;
[0016] FIG. **5** is a schematic structural diagram of hardware of a terminal according to an embodiment of this application; and
[0017] FIG. **6** is a schematic structural diagram of hardware of a network-side device according to an embodiment of this application.
DETAILED DESCRIPTION
[0018] The following clearly describes the technical solutions in the embodiments of this application with reference to the accompanying drawings in the embodiments of this application. Apparently, the described embodiments are only some rather than all of the embodiments of this application. All other embodiments obtained by persons of ordinary skill in the art based on the embodiments of this application shall fall within the protection scope of this application.
[0019] The terms “first”, “second”, and the like in this specification and claims of this application are used to distinguish between similar objects rather than to describe a specific order or sequence. It should be understood that terms used in this way are interchangeable in appropriate circumstances so that the embodiments of this application can be implemented in other orders than the order illustrated or described herein. In addition, “first” and “second” are usually used to distinguish objects of a same type, and do not restrict a quantity of objects. For example, there may be one or a plurality of first objects. In addition, “and/or” in the specification and claims represents at least one of connected objects, and the character “/” generally indicates that the associated

objects have an “or” relationship.

[0020] It should be noted that technologies described in the embodiments of this application are not limited to a long term evolution (LTE)/LTE-Advanced (LTE-A) system, and may also be applied to other wireless communication systems, for example, code division multiple access (CDMA), time division multiple access (TDMA), frequency division multiple access (FDMA), orthogonal frequency division multiple access (OFDMA), single-carrier frequency division multiple access (SC-FDMA), and other systems. The terms “system” and “network” in the embodiments of this application are often used interchangeably, and the technology described herein may be used in the above-mentioned systems and radio technologies as well as other systems and radio technologies. In the following descriptions, a new radio (NR) system is described for an illustration purpose, and NR terms are used in most of the following descriptions, although these technologies may also be applied to other applications than an NR system application, for example, the 6th generation (6G) communication system.

[0021] FIG. **1** is a block diagram of a wireless communication system to which the embodiments of this application are applied. The wireless communication system includes a terminal **11** and a network-side device **12**. The terminal **11** may be a terminal-side device, such as a mobile phone, a tablet personal computer, a laptop computer or notebook computer, a personal digital assistant (PDA), a palmtop computer, a netbook, an ultra-mobile personal computer (UMPC), a mobile Internet device (MID), an augmented reality (AR)/virtual reality (VR) device, a robot, a wearable device, vehicular user equipment (VUE), pedestrian user equipment (PUE), smart-home appliance (a smart-home device having a wireless communication function, for example, a refrigerator, a television, a washing machine, or furniture), a game console, a personal computer (PC), a teller machine, or a self-service machine. The wearable device includes a smart watch, a smart band, smart earphones, smart glasses, smart jewelry (a smart bracelet, a smart chain bracelet, a smart ring, a smart necklace, a smart anklet, a smart chain anklet, or the like), a smart wrist band, smart clothing, or the like. It should be noted that the embodiments of this application do not impose any limitation on a specific type of the terminal **11**. The network-side device **12** may include an access network device or a core network device, where the access network device may also be referred to as a radio access network device, a radio access network (RAN), a radio access network function, or a radio access network unit. The access network device may include a base station, a wireless local area network (WLAN) access point, or a wireless fidelity (Wi-Fi) node. The base station may be referred to as a NodeB, an evolved NodeB (eNB), an access point, a base transceiver station (BTS), a radio base station, a radio transceiver, a basic service set (BSS), an extended service set (ESS), a home NodeB, a home evolved NodeB, a transmission reception point (TRP), or another appropriate term in the art. Provided that the same technical effect is achieved, the base station is not limited to a specific technical term. It should be noted that the base station in the NR system is only used as an example in the embodiments of this application for illustration, but a specific type of the base station is not limited.

[0022] In order for the network to understand the situation of available terminal resources at a specific moment and avoid the measurement failure caused by the lack of resources for the measurement behavior triggered by the network, it is necessary to formulate a rule for occupation of terminal resources to determine the available resources for the terminal. However, in the related art, the rules for occupation of terminal resources (for example, CSI processing units (CPU), active resources, and active ports) are associated with a quantity of ports of measurement resources or a quantity of measurement resources. However, if the terminal resource occupation is determined only according to the quantity of ports of measurement resources or the quantity of measurement resources, there may be inaccurate estimation of the terminal resource occupation. For example, in a case that a capability of a terminal is overestimated, that is, compared with resources determined according to an occupation rule, the terminal may need more resources to obtain the predicted CSI or time-domain CSI.

[0023] Embodiments of this application provide a method for determining terminal resource occupation, a communication device, and a storage medium, which can solve the problem that the estimation of terminal resource occupation may be inaccurate.

[0024] The following describes in detail a method for determining terminal resource occupation provided in the embodiments of this application using some embodiments and application scenarios thereof with reference to the accompanying drawings.

[0025] In the embodiments of this application, the capability of terminal (User Equipment, UE) to process CSI reports, that is, a quantity N_{CPU} of simultaneous CSI calculations supported, must be reported to a network. If one UE supports N_{CPU} simultaneous CSI calculations, this means the UE has N_{CPU} CSI processing units (CPU) for processing CSI reports across all configured cells.

[0026] Available CPU quantity means that, in a certain orthogonal frequency-division multiplexing (OFDM) symbol, if L CPUs have already been occupied for processing CSI reports, the UE still has $N_{CPU}-L$ available CPUs. If there are N CSI reports to start occupying CPUs in this OFDM symbol, and the $n=0, \ldots, N-1$-th report requires to $O_{CPU}^{(n)}$ CPUs to be occupied, it is possible that a quantity of available CPUs is less than a quantity of CPUs required to be occupied by N CSIs. In this case, the UE does not need to update $N-M$ CSI reports with lower priority, where $0 \le M \le N$ is the maximum that satisfies $\Sigma_{n=0}^{M-1} O_{CPU}^{(n)} \le N_{CPU}-L$.

[0027] In the related art, the CPU occupation quantity O_{CPU} for CSI reports is defined as shown in Table 1:

TABLE-US-00001 TABLE 1 Report quantity (reportQuantity) Others O_{CPU} none (with trs-Info 0 configured) cri-RSRP — 1 ssb-Index-RSRP cri-SINR ssb-Index-SINR none (without trs-Info) cri-RI-PMI-CQI A-CSI, without (w/o) UL-SCH or N_{CPU} cri-RI-i1 HARQ-ACK, L = 0 (no CPU cri-RI-i1-CQI occupation), cri-RI-CQI One wideband CSI (WB CSI), cri-RI-LI-PMI-CQI and ≤4 CSI-RS (CSI-RS) ports without CRI, Type-I codebook, or cri-RI-CQI Other cases K_s

[0028] K_s is a quantity of CSI-RS resources included in the channel state information reference signal (CSI Reference Signal, CSI-RS) resource set (CSI-RS resource set) for channel measurement.

[0029] Regarding the CPU occupancy time, the start and end OFDM symbols during which the CSI reports occupy the CPUs may be as shown in Table 2.

TABLE-US-00002 TABLE 2 Start symbol End symbol P/SP CSI The earliest symbol in The last symbol of the (except for the transmission occasion PUSCH/PUCCH for Case 1) (occasion) of the CSI- transmission of CSI. and the RS/CSI-IM/SSB for the reportQuantity nearest channel or is not none. interference measurement before the corresponding CSI reference resource. A-CSI and The first one symbol The last symbol of the Case 1, and the after the PDCCH that PUSCH for transmission reportQuantity triggers the CSI report. of CSI. is not none. SP-CSI The earliest symbol of Z'_3 symbols after the last (except for the transmission of the symbol of the transmission Case 1), the P/SP CSI-RS/SSB of the CSI-RS/SSB resource reportQuantity resource for the for the latest channel is none and the latest channel measure- measurement used for L1- trs-Infor is ment used for L1-RSRP RSRP calculation. not configured. calculation. AP-CSI, the The first one symbol The last symbol between Z_3 reportQuantity after the PDCCH that symbols after the first one is none and the triggers the CSI symbol behind this PDCCH trs-Infor is report. and Z'_3 symbols after the last not configured. symbol of the transmission of the CSI-RS/SSB resource for the latest channel measurement used for L1- RSRP calculation.

[0030] Case 1 refers to the first one transmission of PUSCH-based SP-CSI report activated by PDCCH.

[0031] In any slot, a quantity of active CSI-RS ports or active CSI-RS resources of UE in an active bandwidth part (BWP) does not exceed the capability reported by the UE.

[0032] Non-zero power CSI-RS (NZP CSI-RS) resources are in an active state within the following

time periods:
[0033] In an aperiodic CSI-RS, they start from the end of a physical downlink control channel (PDCCH) containing a request and ends at the end of a physical uplink shared channel (PUSCH) associated with the aperiodic CSI-RS.
[0034] In a semi-persistent CSI-RS, they start from the end when the activation command is applied and ends at the end when the deactivation command is applied.
[0035] In a periodic CSI-RS, they start from the time when the periodic CSI-RS is configured by high-layer signaling and ends at the time when the periodic CSI-RS configuration is released.
[0036] If one CSI-RS resource is associated with one or more CSI report settings for N times, the CSI-RS resource and CSI-RS ports within the CSI-RS resource are counted N times.
[0037] In the related art, the occupation rules for CPUs, active resources, and active ports are related to a quantity of ports of measurement resources or a quantity of measurement resources, not but related to the predicted CSI or time-domain CSI feedback behavior; and the occupation duration of the CPUs is also not related to the predicted CSI or time-domain CSI feedback behavior. However, due to the relatively high computational complexity of the predicted CSI or time-domain CSI feedback process, ignoring the resource occupation determined by the predicted CSI or time-domain CSI feedback behaviors may result in overestimation of terminal resource occupation, meaning that, compared with terminal resource occupation determined using the relevant rules, the terminal may need more resources to obtain the predicted CSI or time-domain CSI. In view of the foregoing problems, an embodiment of this application provides a method for determining terminal resource occupation.
[0038] FIG. **2** is a schematic flowchart of a method for determining terminal resource occupation according to an embodiment of this application. The method **200** may be executed by a communication device. To be specific, the method may be performed by software or hardware installed on the communication device. As shown in FIG. **2**, the method may include the following step.
[0039] S**210**: The communication device determines terminal resource occupation according to a target rule related to target configuration information.
[0040] In this embodiment of this application, the target configuration information includes at least one of the following: a feedback configuration of the terminal for predicted CSI, and a feedback configuration of the terminal for time-domain CSI, meaning that, in this embodiment of this application, the target rule is related to predicted CSI feedback or time-domain CSI feedback. For example, the target configuration information may include at least one of a configuration of a quantity of time-domain units for predicted CSI feedback or time-domain CSI feedback, a resource configuration associated with the CSI report setting, a channel configuration for triggering the report setting, and the like. The CSI report setting for predicted CSI feedback may be one network-configured CSI report setting that may be used to obtain the CSI at some future moments.
[0041] In this embodiment of this application, the resource occupation by the terminal includes but is not limited to obtaining predicted CSI or time-domain CSI by the terminal.
[0042] In this embodiment of this application, the target rule includes but is not limited to at least one of the following: [0043] a CSI processing unit (CPU) counting rule; [0044] a CPU occupancy time rule; [0045] an active resource counting rule; and [0046] an active port counting rule.
[0047] In this embodiment of this application, the communication device may be a terminal. After determining the resource occupation according to the method provided in this embodiment of this application, the terminal may determine, based on a resource occupation status, whether there are resources for calculating a new CSI report; if there are no such resources, a new CSI report may not be calculated. Alternatively, the communication device may be a network-side device. For example, after determining the terminal resource occupation according to the method provided in this embodiment of this application, the network-side device may determine, based on available resources fed back by the terminal and currently occupied resources, whether to add a new CSI

report calculation or configure a higher-priority CSI report, so as to ensure that resources are available for calculation of the higher-priority report.

[0048] In a possible implementation, the CPU counting rule is related to a quantity (N4) of time-domain units, where the quantity (N4) of time-domain units includes one of the following: a target configuration parameter associated with the target configuration information and a target configuration parameter associated with a CSI report setting; where the CSI report setting is a CSI report setting associated with the target configuration information, and the target configuration parameter is used to indicate a quantity of time-domain units associated with feeding back or obtaining of a precoding matrix indicator PMI by the terminal, or a quantity of time-domain units associated with feeding back or obtaining of CSI by the terminal. For example, a quantity of time-domain units configured by a network is 5, but the terminal selects less than 5 from them. For example, if the terminal selects 4 time-domain units, the quantity N4 of time-domain units may be 4.

[0049] In a possible implementation, the CPU counting rule being related to a quantity of time-domain units includes at least one of the following: (1) to (3). [0050] (1) For one CSI report setting for predicted CSI feedback or one CSI report setting for time-domain CSI feedback, a CPU occupation quantity is K1 times the quantity of time-domain units, where K1 is a rational number greater than 0.

[0051] In this embodiment of this application, the CSI report setting for predicted CSI feedback is a CSI report setting configured by the network, and this CSI report setting may be used to obtain the CSI at some future moments.

[0052] In the foregoing possible implementation, K1 may be determined based on a target value fed back by the terminal. For example, the terminal may feed back the value of K1 to the network-side device, where the target value may include one of the following: a quantity of CPUs required for obtaining CSIs in one time unit, a quantity of CPUs associated with one CSI-RS, and a quantity of CPUs associated with one time-domain unit.

[0053] For example, if one periodic CSI report setting for predicted CSI feedback or time-domain CSI feedback is associated with one periodic CSI-RS, and a quantity (N4) of time-domain units configured for reporting by the network is 4, a quantity of CPUs associated with this CSI report setting is 4, and in this case, K1=1. If the terminal feeds back that 2 CPUs are required to obtain the CSI of each time-domain unit, the quantity of CPUs associated with this CSI report setting is 8, and in this case, K1=2.

[0054] As another example, if one aperiodic CSI report setting for predicted CSI feedback or time-domain CSI feedback is associated with four aperiodic CSI-RSs, and a quantity (N4) of time-domain units configured for reporting by the network is 4, a quantity of CPUs associated with this CSI report setting is 4, and in this case, K1=1. If the terminal feeds back that 2 CPUs are required to obtain the CSI of each time-domain unit, the quantity of CPUs associated with this CSI report setting is 8, and in this case, K1=2. [0055] (2) For one CSI report setting for predicted CSI feedback or one CSI report setting for time-domain CSI feedback, a CPU occupation quantity is a sum of K2 times the quantity of time-domain units and K3 times a quantity of channel state information reference signals (CSI-RS) associated with the CSI report setting, where K2 and K3 are both rational numbers greater than 0.

[0056] K2 may be the same as or different from K1. The embodiments of this application do not specifically limit thereto.

[0057] In this embodiment of this application, the CSI-RS may be a CSI-RS for channel measurement, or may be a CSI-RS for interference measurement, or may be a CSI-RS for other usages.

[0058] K2 and K3 may be determined based on a target value fed back by the terminal; where the target value may include at least one of the following: a quantity of CPUs required to obtain CSIs in one time unit, a quantity of CPUs associated with one CSI-RS, and a quantity of CPUs

associated with one time-domain unit. The terminal may feed back the target value, such that the network-side device may determine the values of K2 and K3. For example, the terminal feeds back a combination (K2,K3). Alternatively, the terminal may feed back K2 and K3 separately. For example, the terminal feeds back K2 to indicate the quantity associated with one time-domain unit, and feeds back K3 to indicate the quantity associated with one CSI-RS. As another example, the terminal may feed back a plurality of combinations, with each combination associated with a quantity of CSI reference signal ports, one K2, and/or one K3, and the network needs to determine K2 and/or K3 based on a quantity of configured measurement ports during quantity calculation.
[0059] For example, if one periodic CSI report setting for predicted CSI feedback or time-domain CSI feedback is associated with one periodic CSI-RS, and a quantity (N4) of time-domain units configured for reporting by the network is 4, a quantity of CPUs associated with this CSI report setting is 4+1-5, and in this case, K2=1 and K3=1.
[0060] As another example, if one aperiodic CSI report setting for predicted CSI feedback or time-domain CSI feedback is associated with four aperiodic CSI-RS, and a quantity (N4) of time-domain units configured for reporting by the network is 4, a quantity of CPUs associated with this CSI report setting is 4+4=8, and in this case, K2=1 and K3=1. [0061] (3) For one CSI report setting for predicted CSI feedback or one CSI report setting for time-domain CSI feedback, a CPU occupation quantity is a maximum value between K4 times the quantity of time-domain units and K5 times the quantity of CSI-RSs associated with the CSI report setting, where K4 and K5 are both rational numbers greater than 0.
[0062] Optionally, K4 and K5 may be determined based on a target value fed back by the terminal; where the target value includes one of the following: a quantity of CPUs required to obtain CSIs in one time unit, a quantity of CPUs associated with one CSI-RS, and a quantity of CPUs associated with one time-domain unit. For example, the terminal feeds back a combination (K4,K5). Alternatively, the terminal may feed back K4 and K5 separately. For example, the terminal feeds back K4 to indicate the quantity associated with one time-domain unit, and feeds back K5 to indicate the quantity associated with one CSI-RS. As another example, the terminal may feed back a plurality of combinations, with each combination associated with a quantity of CSI reference signal ports, one K4, and/or one K5, and the network needs to determine K4 and/or K5 based on a quantity of configured measurement ports during quantity calculation.
[0063] In a possible implementation, the CPU occupancy time rule is related to a quantity of time-domain units, where a quantity (N4) of time-domain units includes one of the following: a target configuration parameter associated with the target configuration information and a target configuration parameter associated with a CSI report setting; where the CSI report setting is a CSI report setting associated with the target configuration information, and the target configuration parameter is used to indicate a quantity of time-domain units associated with feeding back or obtaining of a precoding matrix indicator PMI by the terminal, or a quantity of time-domain units associated with feeding back or obtaining of CSI by the terminal. The quantity N4 of time-domain units in this possible implementation is the same as the quantity N4 of time-domain units in the foregoing possible implementation, and for specific details, reference may be made to the description of the foregoing possible implementation.
[0064] In a possible implementation, the CPU occupancy time rule being related to a quantity of time-domain units includes at least one of the following (1) and (2). [0065] (1) A CPU occupation start time of a first target CSI report setting is a target time, where the target time is the first one symbol of a measurement occasion of an earliest measurement signal among K6×N4 measurement occasions before a CSI reference resource associated with the first target CSI report setting, or a slot in which the measurement occasion of the earliest measurement signal is located; the first target CSI report setting includes a periodic CSI report setting or a semi-persistent CSI report setting; K6 is a rational number greater than 0, and N4 is a quantity of time-domain units associated with the first target CSI report setting.

[0066] In this possible implementation, for one periodic or semi-persistent CSI report setting, the CPU occupation start time associated with it is from the first one transmission symbol of the earliest occasion of the CSI-RS/CSI interference measurement (CSI-IM)/synchronization signal and PBCH block (SSB) for channel measurement or interference measurement among the K5×N4 measurement occasions before the CSI reference resource associated with this CSI report setting, or from the slot in which the earliest occasion of the CSI-RS/CSI-IM/SSB for channel measurement or interference measurement is located.
[0067] K6 may be determined based on a value fed back by the terminal, meaning that the terminal may feed back a value to the network-side device, and the network-side device may determine the value of K6 based on this value.
[0068] For example, if one periodic CSI report setting for predicted CSI feedback or time-domain CSI feedback is associated with one CSI-RS for channel measurement with a period of 4, and a quantity (N4) of time-domain units configured for reporting by the network is 4, the terminal determines that the CSI reference resource is slot n according to the protocol agreement. Assuming that the latest previous transmission occasion of this CSI-RS before slot n is slot n−1, the CPU occupation start time associated with this CSI report setting is the first one transmission symbol of the transmission occasion associated with slot (n−1−4×N4). The position of the first one symbol is determined based on a start symbol of the CSI-RS configured by the network. K6=1. [0069] (2) A CPU occupation end time associated with a second target CSI report setting is at least one of the following: [0070] a first time associated with a first target symbol, where the first target symbol is a last symbol of a last time-domain unit among N4 time-domain units associated with the second target CSI report setting; [0071] a maximum value of at least two of the first time, a second time, and a third time, where the second time is a time associated with a last symbol in which a measurement signal associated with the second target CSI report setting is located, and the third time is a time associated with a last symbol of a target physical channel for transmission of the second target CSI report setting; and [0072] the second target CSI report setting includes any one of the following: a periodic CSI report setting, a semi-persistent CSI report setting, and an aperiodic CSI report setting.
[0073] In the foregoing possible implementation, for one CSI report setting (periodic or semi-persistent or aperiodic), the CPU occupation end time associated with it may be a time associated with the last symbol of the last time-domain unit among the N4 time-domain units associated with this CSI report setting.
[0074] For example, for one CSI report for predicted or time-domain CSI feedback, the terminal may be configured by default or instructed by the network to associate it with one or more CSI-RSs for channel measurement for monitoring the prediction performance. If this CSI report is associated with N4 time-domain units, where the associated slots are (slot n, slot n+1, slot n+2, slot n+3), and slot n is a slot for the CSI report feedback determined by the terminal according to the high-layer signaling, the CPU occupation end time associated with this CSI report is the last symbol of slot n+3.
[0075] Alternatively, for one CSI report setting (periodic or semi-persistent or aperiodic), the CPU occupancy end time associated with it may be a maximum value among a time T1 associated with the last symbol of the last time-domain unit among the N4 time-domain units associated with this CSI report setting, and/or a time T2 associated with the last symbol of the CSI-RS/CSI-IM/SSB associated with this CSI report setting for channel or interference measurement, and/or a time T3 associated with the last symbol of the PUSCH/physical uplink control channel (PUCCH) for transmission of this CSI report setting.
[0076] In a possible implementation, the CPU occupancy time rule may be related to a CSI-RS parameter in the target configuration information.
[0077] Optionally, the CPU occupancy time rule being related to a CSI-RS parameter in the target configuration information may include at least one of the following: [0078] (1) A CPU occupation

end time associated with an aperiodic CSI report setting is a maximum value of the following two items: a time associated with a last symbol of a target physical channel for transmission of the aperiodic CSI report setting, and a time associated with a last symbol in which a CSI-RS associated with the aperiodic CSI report setting is located, for example, a maximum value between the time associated with the last symbol of the PUSCH/PUCCH for transmission of this CSI report setting and the time associated with the last symbol of the CSI-RS/CSI-IM/SSB associated with this CSI report setting for channel or interference measurement.
[0079] For example, if one aperiodic CSI report for predicted or time-domain CSI feedback is associated with six aperiodic CSI-RSs for channel measurement, where the associated slots are (slot n−6, slot n−5, slot n−4, slot n−3, slot n, slot n+1), and slot n is a slot for the CSI report feedback determined by the terminal according to high-layer signaling, the CPU occupation end time associated with this CSI report is the last symbol of the CSI-RS associated with slot n+1.
[0080] (2) A CPU occupation end time associated with a second target CSI report setting is a time associated with a second target symbol, where the second target symbol is a last symbol of a last transmission occasion among latest transmission occasions corresponding to a plurality of CSI-RS for channel measurement associated with the second target CSI report setting. The second target CSI report setting includes any one of the following: a periodic CSI report setting, a semi-persistent CSI report setting, and an aperiodic CSI report setting.
[0081] For example, for one CSI report setting (periodic or semi-persistent or aperiodic), the CPU occupation end time associated with it may be a time associated with the last symbol of the last transmission occasion among the latest transmission occasions corresponding to the plurality of CSI-RSs for channel measurement associated with this CSI report setting. The latest transmission occasion is a latest transmission occasion starting from the first one symbol after the channel carrying the activation or triggering of this CSI report setting.
[0082] For example, if the network activates one CSI report setting for training at the last symbol of slot n, where the CSI report setting is associated with four periodic CSI-RSs (with a period of 20 slots), and the latest transmission occasions corresponding to these four CSI-RSs are slot n+4, slot n+5, slot n+6, and slot n+7, the CPU occupation end time associated with this CSI report is the last symbol of the measurement occasion associated with slot n+7.
[0083] As another example, if the network activates one CSI report setting for training at the last symbol of slot n, where the CSI report setting is associated with four aperiodic CSI-RSs, and the latest transmission occasions corresponding to these four CSI-RSs are slot n+4, slot n+5, slot n+6, and slot n+7, the CPU occupation end time associated with this CSI report is the last symbol of the CSI-RS associated with slot n+7. [0084] (3) A CPU occupation end time associated with a second target CSI report setting is a time associated with a third target symbol, where the third target symbol is a last symbol of the N-th transmission occasion of one periodic or semi-persistent CSI-RS for channel measurement associated with the second target CSI report setting, and N is an integer greater than 0; where the second target CSI report setting includes one of the following: a periodic CSI report setting, a semi-persistent CSI report setting, and an aperiodic CSI report setting.
[0085] For example, for one CSI report setting (periodic or semi-persistent or aperiodic), the CPU occupation end time associated with it may be a time associated with the last symbol of the N-th transmission occasion of the one periodic or semi-persistent CSI-RS for channel measurement associated with this CSI report setting. The first transmission occasion is a first transmission occasion starting from the first one symbol after the channel carrying the activation or triggering of this CSI report setting, and so on up to the N-th transmission occasion.
[0086] Optionally, N may be indicated by a network or be a value fed back by a terminal.
[0087] For example, if the network activates one CSI report setting for training at the last symbol of slot n, where the CSI report setting is associated with one periodic CSI-RS (with a period of four slots), and the latest transmission occasion of this CSI-RS is slot n+1, and the network instructs the

terminal to use four measurement occasions for training, the CPU occupation end time associated with this CSI report is the last symbol of the measurement occasion associated with slot n+1+3×4=slot n+13.

[0088] In a possible implementation, the CPU occupancy time rule may be related to a physical layer channel triggering the CSI report setting configured by the target configuration information.

[0089] Optionally, the CPU occupancy time rule being related to the physical layer channel that triggers the CSI report setting configured in the target configuration information may include: a CPU occupancy time associated with a CSI report setting starts from a first symbol after a physical channel carrying activation or triggering signalling for the CSI report setting, and ends after a total of T4 symbols or slots, where T4 is an integer greater than 0.

[0090] For example, for a CSI report setting (periodic or semi-persistent or aperiodic), the CPU occupation end time associated with it may start from the first one symbol T3 after a physical channel carrying the activation or triggering of this CSI report setting, and end after T4 symbols or slots are accumulated.

[0091] For example, if the network activates one CSI report setting for training at the last symbol of slot n, where the CSI report setting is associated with one periodic CSI-RS (with a period of four slots), and the terminal obtains T4=140 symbols according to the protocol. Assuming that one slot corresponds to 14 symbols, the CPU occupation end time associated with this CSI report is the last symbol of slot n+10.

[0092] Optionally, T4 may be a value indicated by a network, or may be a value fed back by a terminal, or may be a value specified by the protocol.

[0093] In a possible implementation, the active resource counting rule is related to a quantity of time-domain units, where the quantity of time-domain units includes one of the following: a target configuration parameter associated with the target configuration information and a target configuration parameter associated with a CSI report setting; where the CSI report setting is a CSI report setting associated with the target configuration information, and the target configuration parameter is used to indicate a quantity of time-domain units associated with feeding back or obtaining of a precoding matrix indicator PMI by the terminal, or a quantity of time-domain units associated with feeding back or obtaining of CSI by the terminal. The quantity N4 of time-domain units is the same as the quantity N4 of time-domain units in the foregoing possible implementation, and for specific details, reference may be made to the foregoing relevant description.

[0094] In a possible implementation, the active resource counting rule being related to a quantity of time-domain units includes at least one of the following: [0095] (1) In a case that a first CSI report setting is associated with one target CSI-RS, a count of active resources associated with the target CSI-RS is K7×N4; where K7 is a rational number greater than 0, and N4 is a quantity of time-domain units associated with the first CSI report setting.

[0096] In this possible implementation, if one CSI report setting for predicted CSI feedback or time-domain CSI feedback is associated with one periodic or semi-persistent channel measurement resource (such as CSI-RS), the count of active resources associated with this measurement resource is K7×N4 active resources.

[0097] Optionally, K7 may be determined based on a value fed back by the terminal, meaning that the terminal may feed back a value, and the network-side device may determine the value of K7 based on this value.

[0098] For example, if one periodic CSI report setting for predicted CSI feedback or time-domain CSI feedback is associated with one periodic CSI-RS, and a quantity (N4) of time-domain units configured for reporting by the network is 4, a quantity of active resources associated with this CSI report setting is 4, and in this case, K7=1. [0099] (2) In a case that the first CSI report setting is associated with a plurality of target CSI-RSs, a count of active resources associated with each first CSI-RS in the plurality of target CSI-RSs is K8×N4, and a count of active resources associated with each second CSI-RS in the plurality of first CSI-RSs is K9, where the first CSI-RS is a CSI-

RS for obtaining predicted CSI, and the second CSI-RS is a CSI-RS for training a prediction algorithm or a prediction filter of the terminal; K8 and K9 are both rational numbers greater than 0, N4 is a quantity of time-domain units associated with the first CSI report setting, the first CSI-RS includes a periodic CSI-RS or a semi-persistent CSI-RS; and the first CSI report setting includes a CSI report setting for predicted CSI feedback or a CSI report setting for time-domain CSI feedback.
[0100] In this possible implementation, if one CSI report setting for predicted CSI feedback or time-domain CSI feedback is associated with a plurality of periodic or semi-persistent channel measurement resources (such as CSI-RSs), the count of active resources associated with each measurement resource used for obtaining predicted CSI in the plurality of measurement resources is K8×N4 active resources, and the count of active resources associated with each resource used for terminal training in the plurality of measurement resources is K9 active resources.
[0101] Optionally, K8 and K9 may be determined based on values fed back by the terminal. K8 may be the same as or different from K7.
[0102] For example, if one periodic CSI report setting for predicted CSI feedback or time-domain CSI feedback is associated with two periodic CSI-RSs, one of which is used for prediction and the other is used for training a prediction filter of the terminal, and a quantity (N4) of time-domain units configured for reporting by the network is 4, a quantity of active resources associated with this CSI report setting is 8=4+4, and in this case, K8=1, and K9=4.
[0103] In a possible implementation, the active port counting rule may be related to a quantity of time-domain units, where the quantity of time-domain units includes one of the following: a target configuration parameter associated with the target configuration information and a target configuration parameter associated with a CSI report setting; where the CSI report setting is a CSI report setting associated with the target configuration information, and the target configuration parameter is used to indicate a quantity of time-domain units associated with feeding back or obtaining of a precoding matrix indicator PMI by the terminal, or a quantity of time-domain units associated with feeding back or obtaining of CSI by the terminal. The quantity of time-domain units is the same as the quantity of time-domain units in the foregoing possible implementation, and for specific details, reference may be made to the foregoing possible implementation.
[0104] In a possible implementation, the active port counting rule being related to a quantity of time-domain units may include at least one of the following (1) and (2). [0105] (1) In a case that a first CSI report setting is associated with one target CSI-RS, the count of active ports associated with the target CSI-RS is K10×N4×N_p, where N_p is a quantity of ports of the target CSI-RS, K10 is a rational number greater than 0, N4 is a quantity of time-domain units associated with the first CSI report setting, and the target CSI-RS includes a periodic CSI-RS or a semi-persistent CSI-RS.
[0106] In this possible implementation, if one CSI report setting for predicted CSI feedback or time-domain CSI feedback is associated with one periodic or semi-persistent channel measurement resource (such as CSI-RS), the count of active resources associated with this measurement resource is K10×N4×N_p active ports.
[0107] K10 may be determined based on a value fed back by the terminal. Optionally, K10 may be the same as or different from K7.
[0108] For example, if one periodic CSI report setting for predicted CSI feedback or time-domain CSI feedback is associated with one periodic CSI-RS with 16 ports, and a quantity (N4) of time-domain units configured for reporting by the network is 4, a quantity of active ports associated with this CSI report setting is 4×16=64, and in this case, K10=1. [0109] (2) In a case that the first CSI report setting is associated with a plurality of target CSI-RSs, a count of active ports associated with each first CSI-RS in the plurality of target CSI-RSs is K11×N4×N_p1, and a count of active resources associated with each second CSI-RS in the plurality of first CSI-RSs is K12×N_p2, where the first CSI-RS is a CSI-RS for obtaining predicted CSI, and the second CSI-RS is a CSI-

RS for training CSI, N_p1 is a quantity of ports of the first channel measurement resource, and N_p2 is a quantity of ports of the second CSI-RS; K11 and K12 are both rational numbers greater than 0, N4 is the quantity of time-domain units associated with the first CSI report setting, the target CSI-RS includes a periodic CSI-RS or a semi-persistent CSI-RS; and the first CSI report setting includes a CSI report setting for predicted CSI feedback or a CSI report setting for time-domain CSI feedback.
[0110] In this possible implementation, if one CSI report setting for predicted CSI feedback or time-domain CSI feedback is associated with a plurality of periodic or semi-persistent channel measurement resources (such as CSI-RSs), the count of active resources associated with each measurement resource used for obtaining predicted CSI in the plurality of measurement resources is K11×N4×N p1 active ports, and the count of active resources associated with each resource used for terminal training in the plurality of measurement resources is K12×N_p2 active resources.
[0111] K11 and K12 are rational numbers greater than 0; N_p1 represents a quantity of ports of the channel measurement resource used for prediction, and N_p2 represents a quantity of ports of the channel measurement resource used for training.
[0112] Optionally, K11 and K12 may be determined based on values fed back by the terminal.
[0113] It should be noted that K11 and K8 may be the same number. K12 and K9 may be the same number.
[0114] For example, if one periodic CSI report setting for predicted CSI feedback or time-domain CSI feedback is associated with two periodic CSI-RSs with 16 ports, one of which is used for prediction and the other is used for training a prediction filter of the terminal, and a quantity (N4) of time-domain units configured for reporting by the network is 4, a quantity of active resources associated with this CSI report setting is 8=4×16+8×16, and in this case, K11=1, and K12=8.
[0115] Through the technical solution provided in this embodiment of this application, the occupation rules for terminal resources such as CPUs/active resources/active ports are provided, such that the occupation rules for terminal resources are related to the CSI predicted or time-domain CSI feedback behavior, thereby avoiding mismatches between the computational complexity of predicted CSI or time-domain CSI and occupied resources.
[0116] The method for determining terminal resource occupation according to this embodiment of this application may be executed by an apparatus for determining terminal resource occupation. In this embodiment of this application, assuming that the apparatus for determining terminal resource occupation performs the method for determining terminal resource occupation, the apparatus for determining terminal resource occupation provided in this embodiment of this application is described.
[0117] FIG. **3** is a schematic structural diagram of an apparatus for determining terminal resource occupation according to an embodiment of this application. As shown in FIG. **3**, the apparatus **300** mainly includes: an obtaining module **301** and a determining module **302**.
[0118] In this embodiment of this application, the obtaining module **301** is configured to obtain a target rule related to target configuration information; where the target configuration information includes at least one of the following: a feedback configuration of the terminal for predicted channel state information CSI, and a feedback configuration of the terminal for time-domain CSI; and the determining module **302** is configured to determine resource occupation by the terminal according to the target rule related to the target configuration information, where the target rule includes at least one of the following: [0119] a CSI processing unit CPU counting rule; [0120] a CPU occupancy time rule; [0121] an active resource counting rule; and [0122] an active port counting rule.
[0123] In a possible implementation, the CPU counting rule is related to a quantity of time-domain units, where the quantity of time-domain units includes one of the following: a target configuration parameter associated with the target configuration information and a target configuration parameter associated with a CSI report setting; where the CSI report setting is a CSI report setting associated

with the target configuration information, and the target configuration parameter is used to indicate a quantity of time-domain units associated with feeding back or obtaining of a precoding matrix indicator PMI by the terminal, or a quantity of time-domain units associated with feeding back or obtaining of CSI by the terminal.

[0124] In a possible implementation, the CPU counting rule being related to a quantity of time-domain units includes at least one of the following: [0125] for one CSI report setting for predicted CSI feedback or one CSI report setting for time-domain CSI feedback, a CPU occupation quantity is K1 times the quantity of time-domain units, where K1 is a rational number greater than 0; [0126] for one CSI report setting for predicted CSI feedback or one CSI report setting for time-domain CSI feedback, a CPU occupation quantity is a sum of K2 times the quantity of time-domain units and K3 times a quantity of CSI-RSs associated with the CSI report setting, where K2 and K3 are both rational numbers greater than 0; and [0127] for one CSI report setting for predicted CSI feedback or one CSI report setting for time-domain CSI feedback, a CPU occupation quantity is a maximum value between K4 times the quantity of time-domain units and K5 times the quantity of CSI-RSs associated with the CSI report setting, where K4 and K5 are both rational numbers greater than 0.

[0128] In a possible implementation, at least one of K1, K2, K3, K4, and K5 is determined based on a target value fed back by the terminal; where the target value includes at least one of the following: a quantity of CPUs required to obtain CSIs in one time unit, a quantity of CPUs associated with one CSI-RS, and a quantity of CPUs associated with one time-domain unit.

[0129] In a possible implementation, the CPU occupancy time rule is related to a quantity of time-domain units, where the quantity of time-domain units includes one of the following: a target configuration parameter associated with the target configuration information and a target configuration parameter associated with a CSI report setting; where the CSI report setting is a CSI report setting associated with the target configuration information, and the target configuration parameter is used to indicate a quantity of time-domain units associated with feeding back or obtaining of a precoding matrix indicator PMI by the terminal, or a quantity of time-domain units associated with feeding back or obtaining of CSI by the terminal.

[0130] In a possible implementation, the CPU occupancy time rule being related to a quantity of time-domain units includes at least one of the following: [0131] a CPU occupation start time of a first target CSI report setting is a target time, where the target time is the first one symbol of a measurement occasion of an earliest measurement signal among K6×N4 measurement occasions before a CSI reference resource associated with the first target CSI report setting, or a slot in which the measurement occasion of the earliest measurement signal is located; the first target CSI report setting includes a periodic CSI report setting or a semi-persistent CSI report setting; K6 is a rational number greater than 0, and N4 is a quantity of time-domain units associated with the first target CSI report setting; and [0132] a CPU occupation end time associated with a second target CSI report setting is at least one of the following: [0133] a first time associated with a first target symbol, where the first target symbol is a last symbol of a last time-domain unit among N4 time-domain units associated with the second target CSI report setting; [0134] a maximum value of at least two of the first time, a second time, and a third time, where the second time is a time associated with a last symbol in which a measurement signal associated with the second target CSI report setting is located, and the third time is a time associated with a last symbol of a target physical channel for transmission of the second target CSI report setting; and [0135] the second target CSI report setting includes any one of the following: a periodic CSI report setting, a semi-persistent CSI report setting, and an aperiodic CSI report setting.

[0136] In a possible implementation, the CPU occupancy time rule is related to a CSI-RS parameter in the target configuration information.

[0137] In a possible implementation, the CPU occupancy time rule is related to a CSI-RS parameter in the target configuration information, and includes at least one of the following: [0138]

a CPU occupation end time associated with an aperiodic CSI report setting is a maximum value of the following two items: a time associated with a last symbol of a target physical channel for transmission of the aperiodic CSI report setting, and a time associated with a last symbol in which a CSI-RS associated with the aperiodic CSI report setting is located; [0139] a CPU occupation end time associated with a second target CSI report setting is a time associated with a second target symbol, where the second target symbol is a last symbol of a last transmission occasion among latest transmission occasions corresponding to a plurality of CSI-RS for channel measurement associated with the second target CSI report setting; and [0140] a CPU occupation end time associated with a second target CSI report setting is a time associated with a third target symbol, where the third target symbol is a last symbol of the N-th transmission occasion of one periodic or semi-persistent CSI-RS for channel measurement associated with the second target CSI report setting, and N is an integer greater than 0; where [0141] the second target CSI report setting includes any one of the following: a periodic CSI report setting, a semi-persistent CSI report setting, and an aperiodic CSI report setting.
[0142] In a possible implementation, N is determined through network indication, or Nis determined based on feedback from the terminal.
[0143] In a possible implementation, the CPU occupancy time rule is related to a physical layer channel triggering the CSI report setting configured by the target configuration information.
[0144] In a possible implementation, the CPU occupancy time rule being related to a physical layer channel triggering the CSI report setting configured by the target configuration information includes: [0145] a CPU occupancy time associated with a CSI report setting starts from a first symbol after a physical channel carrying activation or triggering signalling for the CSI report setting, and ends after a total of T4 symbols or slots, where T4 is an integer greater than 0.
[0146] In a possible implementation, T4 is determined based on any one of the following: network indication, feedback from the terminal, or protocol specification.
[0147] In a possible implementation, the active resource counting rule is related to a quantity of time-domain units, where the quantity of time-domain units includes one of the following: a target configuration parameter associated with the target configuration information and a target configuration parameter associated with a CSI report setting; where the CSI report setting is a CSI report setting associated with the target configuration information, and the target configuration parameter is used to indicate a quantity of time-domain units associated with feeding back or obtaining of a precoding matrix indicator PMI by the terminal, or a quantity of time-domain units associated with feeding back or obtaining of CSI by the terminal.
[0148] In a possible implementation, the active resource counting rule being related to a quantity of time-domain units includes at least one of the following: [0149] in a case that a first CSI report setting is associated with one target CSI-RS, a count of active resources associated with the target CSI-RS is K7×N4; and [0150] in a case that the first CSI report setting is associated with a plurality of target CSI-RSs, a count of active resources associated with each first CSI-RS in the plurality of target CSI-RSs is K8×N4, and a count of active resources associated with each second CSI-RS in the plurality of first CSI-RSs is K9, where the first CSI-RS is a CSI-RS for obtaining predicted CSI, and the second CSI-RS is a CSI-RS for training a prediction algorithm or a prediction filter of the terminal; where [0151] K7, K8, and K9 are rational numbers greater than 0; N4 is a quantity of time-domain units associated with the first CSI report setting; the first CSI-RS includes a periodic CSI-RS or a semi-persistent CSI-RS; and the first CSI report setting includes a CSI report setting for predicted CSI feedback or a CSI report setting for time-domain CSI feedback.
[0152] In a possible implementation, the active port counting rule is related to a quantity of time-domain units, where the quantity of time-domain units includes one of the following: a target configuration parameter associated with the target configuration information and a target configuration parameter associated with a CSI report setting; where the CSI report setting is a CSI

report setting associated with the target configuration information, and the target configuration parameter is used to indicate a quantity of time-domain units associated with feeding back or obtaining of a precoding matrix indicator PMI by the terminal, or a quantity of time-domain units associated with feeding back or obtaining of CSI by the terminal.

[0153] In a possible implementation, the active port counting rule being related to a quantity of time-domain units includes at least one of the following: [0154] in a case that a first CSI report setting is associated with one target CSI-RS, a count of active ports associated with the target CSI-RS is K10×N4×N_p, where N_p is a quantity of ports of the target CSI-RS; and [0155] in a case that the first CSI report setting is associated with a plurality of target CSI-RSs, a count of active ports associated with each first CSI-RS in the plurality of target CSI-RSs is K11×N4×N_p1, and a count of active resources associated with each second CSI-RS in the plurality of first CSI-RSs is K12×N_p2, where the first CSI-RS is a CSI-RS for obtaining predicted CSI, and the second CSI-RS is a CSI-RS for training CSI, N_p1 is a quantity of ports of first channel measurement resources, and N_p2 is a quantity of ports of the second CSI-RSs; where [0156] K10, K11, and K12 are rational numbers greater than 0; N4 is a quantity of time-domain units associated with the first CSI report setting; the target CSI-RS includes a periodic CSI-RS or a semi-persistent CSI-RS; and the first CSI report setting includes a CSI report setting for predicted CSI feedback or a CSI report setting for time-domain CSI feedback.

[0157] The apparatus for determining terminal resource occupation in this embodiment of this application may be an electronic device, for example, an electronic device with an operating system, or may be a component in an electronic device, for example, an integrated circuit or a chip. The electronic device may be a terminal or may be another device except the terminal, for example, a network-side device. For example, the terminal may include but is not limited to the types of the terminal **11** listed above, and the another device may be a server, a network attached storage (NAS), or the like, which are not specifically limited in the embodiments of this application.

[0158] The apparatus for determining terminal resource occupation provided in this embodiment of this application can implement the processes implemented by the method embodiment in FIG. **2**, with the same technical effects achieved. To avoid repetition, details are not described herein again.

[0159] Optionally, as shown in FIG. **4**, an embodiment of this application further provides a communication device **400**, including a processor **401** and a memory **402**, where the memory **402** stores a program or instructions capable of running on the processor **401**. For example, when the communication device **400** is a terminal, the program or instructions are executed by the processor **401** to implement the steps of the foregoing embodiment of the method for determining terminal resource occupation described above, with the same technical effects achieved. In a case that the communication device **400** is a network-side device, when the program or instructions are executed by the processor **401**, the processes of the foregoing embodiment of the method for determining terminal resource occupation are implemented, with the same beneficial effects achieved. To avoid repetition, details are not described herein again.

[0160] An embodiment of this application further provides a communication device, including a processor and a communication interface. The processor is configured to implement the steps of the embodiment of the method for determining terminal resource occupation described above, and the communication interface is configured to communicate with external devices. The communication device embodiment corresponds to the foregoing communication device method embodiment. All implementations in the foregoing method embodiment may be applicable to the communication device embodiment, with the same technical effect achieved.

[0161] The communication device may be a terminal. Specifically, FIG. **5** is a schematic structural diagram of hardware of a terminal for implementing the embodiments of this application.

[0162] The terminal **500** includes, but is not limited to, at least some of components such as a radio frequency unit **501**, a network module **502**, an audio output unit **503**, an input unit **504**, a sensor **505**, a display unit **506**, a user input unit **507**, an interface unit **508**, a memory **509**, and a processor

510.

[0163] Persons skilled in the art can understand that the terminal **500** may further include a power supply (for example, a battery) for supplying power to the components. The power supply may be logically connected to the processor **510** through a power management system. In this way, functions such as charge management, discharge management, and power consumption management are implemented by using the power management system. The structure of the terminal shown in FIG. **5** does not constitute any limitation on the terminal. The terminal may include more or fewer components than shown in the figure, or a combination of some components, or the components disposed differently. Details are not described herein again.

[0164] It should be understood that in this embodiment of this application, the input unit **504** may include a graphics processing unit (GPU) **5041** and a microphone **5042**. The graphics processing unit **5041** processes image data of a static picture or a video that is obtained by an image capture apparatus (for example, a camera) in a video capture mode or an image capture mode. The display unit **506** may include a display panel **5061**, and the display panel **5061** may be configured in a form of a liquid crystal display, an organic light-emitting diode, and the like. The user input unit **507** includes at least one of a touch panel **5071** and other input devices **5072**. The touch panel **5071** is also referred to as a touchscreen. The touch panel **5071** may include two parts: a touch detection apparatus and a touch controller. The other input devices **5072** may include but are not limited to a physical keyboard, a function key (for example, a volume control key or a power on/off key), a trackball, a mouse, a joystick, and the like. Details are not described herein.

[0165] In this embodiment, after receiving downlink data from a network-side device, the radio frequency unit **501** may transmit the downlink data to the processor **510** for processing. In addition, the radio frequency unit **501** may transmit uplink data to the network-side device. Generally, the radio frequency unit **501** includes but is not limited to an antenna, an amplifier, a transceiver, a coupler, a low noise amplifier, and a duplexer.

[0166] The memory **509** may be configured to store software programs or instructions and various data. The memory **509** may include first storage area for storing programs or instructions and a second storage area for storing data. The first storage area may store an operating system, an application program or instruction required by at least one function (for example, a sound playback function or an image playback function), and the like. In addition, the memory **509** may include either a volatile memory or a non-volatile memory, or the memory **509** may include both a volatile memory and a non-volatile memory. The non-volatile memory may be a read-only memory (ROM), a programmable read-only memory (Programmable ROM, PROM), an erasable programmable read-only memory (Erasable PROM, EPROM), an electrically erasable programmable read-only memory (Electrically EPROM, EEPROM), or a flash memory. The volatile memory may be a random access memory (RAM), a static random access memory (Static RAM, SRAM), a dynamic random access memory (Dynamic RAM, DRAM), a synchronous dynamic random access memory (Synchronous DRAM, SDRAM), a double data rate synchronous dynamic random access memory (Double Data Rate SDRAM, DDRSDRAM), an enhanced synchronous dynamic random access memory (Enhanced SDRAM, ESDRAM), a synchronous link dynamic random access memory (Synchlink DRAM, SLDRAM), and a direct rambus random access memory (Direct Rambus RAM, DRRAM). The memory **509** in this embodiment of this application includes but is not limited to these and any other suitable types of memories.

[0167] The processor **510** may include one or more processing units. Optionally, an application processor and a modem processor are integrated in the processor **510**. The application processor primarily processes operations relating to an operating system, user interfaces, application programs, and the like. The modem processor primarily processes radio communication signals, for example, being a baseband processor. It can be understood that the modem processor may alternatively be not integrated in the processor **510**.

[0168] The processor **510** is configured to determine terminal resource occupation according to a target rule related to target configuration information; where [0169] the target configuration information includes at least one of the following: a feedback configuration of the terminal for predicted channel state information CSI, and a feedback configuration of the terminal for time-domain CSI; and [0170] the target rule includes at least one of the following: [0171] a CSI processing unit CPU counting rule; [0172] a CPU occupancy time rule; [0173] an active resource counting rule; and [0174] an active port counting rule.

[0175] Optionally, the communication device may alternatively be a network-side device. Specifically, an embodiment of this application further provides a network-side device. As shown in FIG. **6**, the network-side device **600** includes: an antenna **601**, a radio frequency apparatus **602**, a baseband apparatus **603**, a processor **604**, and a memory **605**. The antenna **601** is connected to the radio frequency apparatus **602**. In an uplink direction, the radio frequency apparatus **602** receives information through the antenna **601**, and sends the received information to the baseband apparatus **603** for processing. In a downlink direction, the baseband apparatus **603** processes to-be-sent information, and sends the information to the radio frequency apparatus **602**; and the radio frequency apparatus **602** processes the received information and then sends the information using the antenna **601**.

[0176] The method performed by the network-side device in the foregoing embodiment may be implemented in the baseband apparatus **603**, and the baseband apparatus **603** includes a baseband processor.

[0177] The baseband apparatus **603** may include, for example, at least one baseband board, where a plurality of chips are disposed on the baseband board. As shown in FIG. **6**, one of the chips is, for example, the baseband processor, and connected to the memory **605** through a bus interface, to invoke the program in the memory **605** to perform the operations of the network device shown in the foregoing method embodiment.

[0178] The network-side device may further include a network interface **606**, where the interface is, for example, a common public radio interface (CPRI).

[0179] Specifically, the network-side device **600** in this embodiment of this application further includes: instructions or a program stored in the memory **605** and capable of running on the processor **604**. The processor **604** invokes the instructions or program in the memory **605** to execute the method executed by the modules shown in FIG. **3**, with the same technical effects achieved. To avoid repetition, details are not described herein again.

[0180] An embodiment of this application further provides a readable storage medium, where the readable storage medium stores a program or instructions, and when the program or instructions are executed by a processor, the processes of the foregoing embodiment of the method for determining terminal resource occupation are implemented, with the same technical effects achieved. To avoid repetition, details are not described herein again.

[0181] The processor is a processor in the terminal described in the foregoing embodiment. The readable storage medium includes a computer-readable storage medium such as a computer read-only memory ROM, a random access memory RAM, a magnetic disk, or an optical disc.

[0182] An embodiment of this application further provides a chip. The chip includes a processor and a communication interface. The communication interface is coupled to the processor. The processor is configured to run a program or instructions to implement each process of the foregoing embodiment of the method for determining terminal resource occupation, with the same technical effect achieved. To avoid repetition, details are not described herein again.

[0183] It should be understood that the chip mentioned in this embodiment of this application may also be referred to as a system-on-chip, a system chip, a system-on-a-chip, or a system on a chip, or the like.

[0184] An embodiment of this application further provides a computer program/program product, where the computer program/program product is stored in a storage medium, and the computer program/program product is executed by at least one processor to implement the processes of the

foregoing embodiment of the method for determining terminal resource occupation, with the same technical effects achieved. To avoid repetition, the details are not repeated herein.
[0185] An embodiment of this application further provides a system for determining terminal resource occupation, including a terminal and a network-side device, where the terminal may be configured to execute the steps of the method for determining terminal resource occupation as described above, and the network-side device may be configured to execute the steps of the method for determining terminal resource occupation as described above.
[0186] In the embodiments of this application, a communication device (including a terminal or a network-side device) may determine terminal resource occupation according to a target rule (such as, one or more of a CPU counting rule, a CPU occupancy time rule, an active resource counting rule, and an active port counting rule) related to a feedback configuration of the terminal for predicted CSI or a feedback configuration of the terminal for time-domain CSI. To be specific, a resource occupation rule adopted by the communication device is related to the feedback configuration for CSI or the feedback configuration for time-domain CSI, and thus the predicted CSI feedback process or time-domain CSI feedback process is considered when determining the resource occupation by the terminal. This prevents inaccurate estimation of resource occupation by the terminal.
[0187] It should be noted that in this specification, the terms “include” and “comprise”, or any of their variants are intended to cover a non-exclusive inclusion, such that a process, method, article, or apparatus that includes a list of elements not only includes those elements but also includes other elements that are not expressly listed, or further includes elements inherent to such process, method, article, or apparatus. In absence of more constraints, an element preceded by “includes a . . . ” does not preclude the existence of other identical elements in the process, method, article, or apparatus that includes the element. Furthermore, it should be noted that the scope of the methods and apparatuses in the embodiments of this application is not limited to performing the functions in the order shown or discussed, but may also include performing the functions in a substantially simultaneous manner or in a reverse order depending on the functions involved. For example, the described methods may be performed in an order different from that described, and various steps may be added, omitted, or combined. In addition, features described with reference to some examples may be combined in other examples.
[0188] By means of the foregoing description of the implementations, persons skilled in the art may clearly understand that the method in the foregoing embodiment may be implemented by software with a necessary general hardware platform. Certainly, the method in the foregoing embodiment may also be implemented by hardware. However, in many cases, the former is a preferred implementation. Based on such an understanding, the technical solutions of this application essentially or the part contributing to the prior art may be implemented in a form of a software product. The software product is stored in a storage medium (for example, a ROM/RAM, a magnetic disk, or an optical disc), and includes several instructions for instructing a terminal (which may be a mobile phone, a computer, a server, an air conditioner, a network device, or the like) to perform the methods described in the embodiments of this application.
[0189] The foregoing describes the embodiments of this application with reference to the accompanying drawings. However, this application is not limited to the foregoing specific embodiments. The foregoing specific embodiments are merely illustrative rather than restrictive. As instructed by this application, persons of ordinary skill in the art may develop many other manners without departing from principles of this application and the protection scope of the claims, and all such manners fall within the protection scope of this application.

Claims

1. A method for determining terminal resource occupation, comprising: determining, by a communication device, terminal resource occupation according to a target rule related to target configuration information; wherein the target configuration information comprises at least one of the following: a feedback configuration of the terminal for predicted channel state information (CSI), or a feedback configuration of the terminal for time-domain CSI; and the target rule comprises: a CSI processing unit CPU counting rule.

2. The method according to claim 1, wherein the CPU counting rule is related to a quantity of time-domain units, wherein the quantity of time-domain units comprises one of the following: a target configuration parameter associated with the target configuration information and a target configuration parameter associated with a CSI report setting; wherein the CSI report setting is a CSI report setting associated with the target configuration information, and the target configuration parameter is used to indicate a quantity of time-domain units associated with feeding back or obtaining of a precoding matrix indicator PMI by the terminal, or a quantity of time-domain units associated with feeding back or obtaining of CSI by the terminal.

3. The method according to claim 2, wherein the CPU counting rule being related to a quantity of time-domain units comprises: for one CSI report setting for predicted CSI feedback or one CSI report setting for time-domain CSI feedback, the CPU occupation quantity is K1 times the quantity of time-domain units, wherein K1 is a rational number greater than 0.

4. The method according to claim 3, wherein K1 is determined based on a target value fed back by the terminal; wherein the target value comprises a quantity of CPUs associated with one time-domain unit.

5. The method according to claim 1, wherein the feedback configuration of the terminal for predicted CSI comprises a configuration of a quantity of time-domain units for predicted CSI feedback; or the feedback configuration of the terminal for time-domain CSI comprises a configuration of a quantity of time-domain units for time-domain CSI feedback.

6. The method according to claim 1, wherein the target rule further comprises at least one of the following: a CPU occupancy time rule; an active resource counting rule; or an active port counting rule.

7. The method according to claim 6, wherein the CPU occupancy time rule is related to a quantity of time-domain units, wherein the quantity of time-domain units comprises one of the following: a target configuration parameter associated with the target configuration information and a target configuration parameter associated with a CSI report setting; wherein the CSI report setting is a CSI report setting associated with the target configuration information, and the target configuration parameter is used to indicate a quantity of time-domain units associated with feeding back or obtaining of a precoding matrix indicator PMI by the terminal, or a quantity of time-domain units associated with feeding back or obtaining of CSI by the terminal; wherein the CPU occupancy time rule being related to a quantity of time-domain units comprises at least one of the following: a CPU occupation start time of a first target CSI report setting is a target time, wherein the target time is the first one symbol of a measurement occasion of an earliest measurement signal among $K6 \times N4$ measurement occasions before a CSI reference resource associated with the first target CSI report setting, or a slot in which the measurement occasion of the earliest measurement signal is located; the first target CSI report setting comprises a periodic CSI report setting or a semi-persistent CSI report setting; K6 is a rational number greater than 0, and N4 is a quantity of time-domain units associated with the first target CSI report setting; or a CPU occupation end time associated with a second target CSI report setting is at least one of the following: a first time associated with a first target symbol, wherein the first target symbol is a last symbol of a last time-domain unit among N4 time-domain units associated with the second target CSI report setting; a maximum value of at least two of the first time, a second time, and a third time, wherein the second time is a time associated with a last symbol in which a measurement signal associated with the second target CSI report setting is located, and the third time is a time associated with a last symbol of a target physical channel for transmission of the second target CSI report setting; or the second target CSI report setting comprises any one of the following: a periodic CSI report setting, a semi-persistent CSI report setting, and an aperiodic CSI report setting.

8. The method according to claim 6, wherein the CPU occupancy time rule is related to a CSI-RS parameter in the target configuration information; wherein the CPU occupancy time rule being related to a CSI-RS parameter in the target configuration information comprises at least one of the following: a CPU occupation end time associated with an aperiodic CSI report setting is a maximum value of the following two items: a time associated with a last symbol of a target physical channel for transmission of the aperiodic CSI report setting, and a time associated with a last symbol in which a CSI-RS associated with the aperiodic CSI report setting is located; a CPU occupation end time associated with a second target CSI report setting is a time associated with a second target symbol, wherein the second target symbol is a last symbol of a last transmission occasion among latest transmission occasions corresponding to a plurality of CSI-RSs for channel measurement associated with the second target CSI report setting; or a CPU occupation end time associated with a second target CSI report setting is a time associated with a third target symbol, wherein the third target symbol is a last symbol of the N-th transmission occasion of one periodic or semi-persistent CSI-RS for channel measurement associated with the second target CSI report setting, and N is an integer greater than 0; wherein the second target CSI report setting comprises any one of the following: a periodic CSI report setting, a semi-persistent CSI report setting, and an aperiodic CSI report setting, wherein N is determined through network indication, or N is determined based on feedback from the terminal.

9. The method according to claim 6, wherein the CPU occupancy time rule is related to a physical layer channel triggering the CSI report setting configured by the target configuration information; wherein the CPU occupancy time rule being related to a physical layer channel triggering the CSI report setting configured in the target configuration information comprises: a CPU occupancy time associated with a CSI report setting starts from a first symbol after a physical channel carrying activation or triggering signalling for the CSI report setting, and ends after a total of T4 symbols or slots, wherein T4 is an integer greater than 0; wherein T4 is determined based on any one of the following: network indication, feedback from the terminal, or protocol specification.

10. The method according to claim 6, wherein the active resource counting rule is related to a quantity of time-domain units, wherein the quantity of time-domain units comprises one of the following: a target configuration parameter associated with the target configuration information and a target configuration parameter associated with a CSI report setting; wherein the CSI report setting is a CSI report setting associated with the target configuration information, and the target configuration parameter is used to indicate a quantity of time-domain units associated with feeding back or obtaining of a precoding matrix indicator PMI by the terminal, or a quantity of time-domain units associated with feeding back or obtaining of CSI by the terminal; wherein the active resource counting rule being related to a quantity of time-domain units comprises at least one of the following: in a case that a first CSI report setting is associated with one target CSI-RS, a count of active resources associated with the target CSI-RS is K7×N4; or in a case that the first CSI report setting is associated with a plurality of target CSI-RSs, a count of active resources associated with each first CSI-RS in the plurality of target CSI-RSs is K8×N4, and a count of active resources associated with each second CSI-RS in the plurality of first CSI-RSs is K9, wherein the first CSI-RS is a CSI-RS for obtaining predicted CSI, and the second CSI-RS is a CSI-RS for training a prediction algorithm or a prediction filter of the terminal; wherein K7, K8, and K9 are rational numbers greater than 0; N4 is a quantity of time-domain units associated with the first CSI report setting; the first CSI-RS comprises a periodic CSI-RS or a semi-persistent CSI-RS; and the first CSI report setting comprises a CSI report setting for predicted CSI feedback or a CSI report setting for time-domain CSI feedback.

11. The method according to claim 6, wherein the active port counting rule is related to a quantity of time-domain units, wherein the quantity of time-domain units comprises one of the following: a target configuration parameter associated with the target configuration information and a target configuration parameter associated with a CSI report setting; wherein the CSI report setting is a CSI report setting associated with the target configuration information, and the target configuration parameter is used to indicate a quantity of time-domain units associated with feeding back or obtaining of a precoding matrix indicator PMI by the terminal, or a quantity of time-domain units associated with feeding back or obtaining of CSI by the terminal; wherein the active port counting rule being related to a quantity of time-domain units comprises at least one of the following: in a case that a first CSI report setting is associated with one target CSI-RS, a count of active ports associated with the target CSI-RS is $K10 \times N4 \times N\_p$, wherein N_p is a quantity of ports of the target CSI-RS; or in a case that the first CSI report setting is associated with a plurality of target CSI-RSs, a count of active ports associated with each first CSI-RS in the plurality of target CSI-RSs is $K11 \times N4 \times N\_p1$, and a count of active resources associated with each second CSI-RS in the plurality of first CSI-RSs is $K12 \times N\_p2$, wherein the first CSI-RS is a CSI-RS for obtaining predicted CSI, and the second CSI-RS is a CSI-RS for training CSI, N_p1 is a quantity of ports of first channel measurement resources, and N_p2 is a quantity of ports of the second CSI-RSs; wherein K10, K11, and K12 are rational numbers greater than 0; N4 is a quantity of time-domain units associated with the first CSI report setting; the target CSI-RS comprises a periodic CSI-RS or a semi-persistent CSI-RS; and the first CSI report setting comprises a CSI report setting for predicted CSI feedback or a CSI report setting for time-domain CSI feedback.
12. An apparatus for determining terminal resource occupation, comprising: at least one hardware processor and a memory, wherein the memory stores a program or instructions capable of running on the at least one hardware processor, and when the program or the instructions are executed by the at least one hardware processor, the at least one hardware processor is directed to: determine terminal resource occupation according to a target rule related to target configuration information; wherein the target configuration information comprises at least one of the following: a feedback configuration of the terminal for predicted channel state information CSI, or a feedback configuration of the terminal for time-domain CSI; and the target rule comprises: a CSI processing unit CPU counting rule.
13. The apparatus according to claim 12, wherein the CPU counting rule is related to a quantity of time-domain units, wherein the quantity of time-domain units comprises one of the following: a target configuration parameter associated with the target configuration information and a target configuration parameter associated with a CSI report setting; wherein the CSI report setting is a CSI report setting associated with the target configuration information, and the target configuration parameter is used to indicate a quantity of time-domain units associated with feeding back or obtaining of a precoding matrix indicator PMI by the terminal, or a quantity of time-domain units associated with feeding back or obtaining of CSI by the terminal.
14. The apparatus according to claim 13, wherein the CPU counting rule being related to a quantity of time-domain units comprises: for one CSI report setting for predicted CSI feedback or one CSI report setting for time-domain CSI feedback, the CPU occupation quantity is K1 times the quantity of time-domain units, wherein K1 is a rational number greater than 0.
15. The apparatus according to claim 12, wherein K1 is determined based on a target value fed back by the terminal; wherein the target value comprises a quantity of CPUs associated with one time-domain unit.
16. The apparatus according to claim 12, wherein the feedback configuration of the terminal for predicted CSI comprises a configuration of a quantity of time-domain units for predicted CSI feedback; or the feedback configuration of the terminal for time-domain CSI comprises a configuration of a quantity of time-domain units for time-domain CSI feedback.
17. A non-transitory computer-readable storage medium storing a program or instructions that,

when executed by at least one hardware processor, direct the at least one hardware processor to: determine terminal resource occupation according to a target rule related to target configuration information; wherein the target configuration information comprises at least one of the following: a feedback configuration of the terminal for predicted channel state information CSI, or a feedback configuration of the terminal for time-domain CSI; and the target rule comprises: a CSI processing unit CPU counting rule.

18. The non-transitory readable storage medium according to claim 17, wherein the CPU counting rule is related to a quantity of time-domain units, wherein the quantity of time-domain units comprises one of the following: a target configuration parameter associated with the target configuration information and a target configuration parameter associated with a CSI report setting; wherein the CSI report setting is a CSI report setting associated with the target configuration information, and the target configuration parameter is used to indicate a quantity of time-domain units associated with feeding back or obtaining of a precoding matrix indicator PMI by the terminal, or a quantity of time-domain units associated with feeding back or obtaining of CSI by the terminal.

19. The non-transitory readable storage medium according to claim 18, wherein the CPU counting rule being related to a quantity of time-domain units comprises: for one CSI report setting for predicted CSI feedback or one CSI report setting for time-domain CSI feedback, the CPU occupation quantity is K1 times the quantity of time-domain units, wherein K1 is a rational number greater than 0.

20. The non-transitory readable storage medium according to claim 19, wherein K1 is determined based on a target value fed back by the terminal; wherein the target value comprises a quantity of CPUs associated with one time-domain unit.