COMMUNICATION METHOD AND RELATED APPARATUS

[0001] This application claims priority to Chinese Patent Application No. 202410264275.X, filed with the China National Intellectual Property Administration on March 7, 2024 and entitled "COMMUNICATION METHOD AND RELATED APPARATUS", which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

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

BACKGROUND

[0003] Compared with terrestrial network (terrestrial network, TN) communication (for example, terrestrial cellular communication), non-terrestrial network (non-terrestrial network, NTN) communication (for example, satellite communication) has significant advantages such as longer communication distance, wide coverage area, and broader communication frequency bands, and can provide communication services for users at any time and any location. Therefore, satellite communication has broad application prospects, with unique advantages especially in international and domestic communication, as well as in emergency response and disaster relief. When an NTN coexists with a TN, interference between the two systems needs to be addressed. Current standards provide a mechanism for limiting adjacent-channel interference by constraining the adjacent channel leakage ratio (adjacent channel leakage ratio, ACLR) at a transmit end and the adjacent channel selectivity (adjacent channel selectivity, ACS) at the receive end, in cases where an NTN spectrum is adjacent to a terrestrial cellular spectrum. However, the current standards are mainly designed for satellites with weak transmit capability. For satellites with strong transmit capability, merely constraining the ACLR of the transmit end and the ACS of the receive end is no longer sufficient.

SUMMARY

[0004] This application provides a communication method and a related apparatus to meet satellite-terrestrial coexistence requirements and help improve communication performance.

[0005] The following describes this application from different aspects. It should be understood that mutual reference may be made to the following implementations and beneficial effects of different aspects.

[0006] According to a first aspect, this application provides a communication method. The method may be applied to a satellite side, for example, a satellite on the satellite side or a component (for example, a circuit, a chip, or a chip system) in a satellite. For example, the method is applied to a satellite. In the method, the satellite may perform communication based on a first radio frequency requirement corresponding to the satellite. The first radio frequency requirement is a radio frequency requirement corresponding to a satellite capability category of the satellite, the first radio frequency requirement is one of a plurality of radio frequency requirements, and each radio frequency requirement corresponds to one satellite capability category. In other words, different radio frequency requirements

may be defined for different satellite capability categories. Therefore, a plurality of satellite-terrestrial coexistence scenarios can be better adapted, to help improve communication performance.

[0007] In a possible implementation, obtaining the first radio frequency requirement corresponding to the satellite includes:

receiving first indication information, where the first indication information indicates the first radio frequency requirement corresponding to the satellite.

[0008] In this implementation, a ground gateway station notifies the satellite of the first radio frequency requirement that needs to be used by the satellite. This helps save computational power.

[0009] In a possible implementation, obtaining the first radio frequency requirement corresponding to the satellite includes:

determining the first radio frequency requirement based on the satellite capability category of the satellite and a first correspondence, where the first correspondence is a correspondence between a satellite capability category and a radio frequency requirement.

[0010] In this implementation, the satellite determines the first radio frequency requirement used by the satellite, so that signaling overheads can be reduced.

[0011] In a possible implementation, obtaining the first radio frequency requirement corresponding to the satellite includes:

determining the first radio frequency requirement based on the satellite capability category of the satellite and a region type of a service region of the satellite.

[0012] In this implementation, in addition to a plurality of satellite capability categories, a plurality of region types are further defined. The satellite may determine, based on the satellite capability category and the region type, the first radio frequency requirement corresponding to the satellite, so that a plurality of satellite coexistence scenarios can be more flexibly adapted, to improve applicability of the solution.

[0013] In a possible implementation, determining the first radio frequency requirement based on the satellite capability category of the satellite and the region type of the service region of the satellite includes:

determining the first radio frequency requirement based on the satellite capability category of the satellite, the region type of the service region of the satellite, and a second correspondence, where the second correspondence is a correspondence between a satellite capability category, a region type, and a radio frequency requirement.

[0014] In this implementation, the correspondence (namely, the second correspondence) between the radio frequency requirement, the satellite capability category, and the region type is defined, so that the satellite can quickly determine, based on the second correspondence, the satellite capability category, and the region type, the first radio frequency requirement corresponding to the satellite, to help improve communication efficiency.

[0015] In a possible implementation, the region type includes a coexistence type and a non-coexistence type.

[0016] When the service region of the satellite overlaps a service region of a terrestrial network device, and a spacing between an operating band of the satellite and an operating band of the terrestrial network device is less than or equal to a first threshold or the operating band of the satellite overlaps the operating band of the terrestrial network device, the region type of the service region of the satellite is the coexistence type.

[0017] When the service region of the satellite does not overlap the service region of the terrestrial network device, or the spacing between the operating band of the satellite and the operating band of the terrestrial network device is greater than the first threshold, the region type of the service region of the satellite is the non-coexistence type.

[0018] In a possible implementation, the method further includes:

receiving region type information, where the region type information indicates the region type of the service region of the satellite.

[0019] In a possible implementation, the method further includes:

sending the operating band of the satellite, where the operating band of the satellite is used to determine the region type information.

[0020] In a possible implementation, the radio frequency requirement includes one or more of the following:

an ACLR or ACS.

[0021] In a possible implementation, performing communication based on the first radio frequency requirement includes:

performing communication based on the first radio frequency requirement and a first radiated requirement corresponding to the satellite, where the first radiated requirement is one of a plurality of radiated requirements, and each radiated requirement corresponds to one satellite capability category.

[0022] In this implementation, for different satellite capability categories, in addition to different radio frequency requirements, different radiated requirements may be further defined. In this way, characteristics of a high-capability satellite can be better adapted, and requirements of hardware costs, product capabilities, and coexistence scenarios are met.

[0023] In a possible implementation, the radiated requirement includes effective isotropic radiated power (effective isotropic radiated power, EIRP) or EIRP density.

[0024] In a possible implementation, the satellite corresponds to the plurality of radio frequency requirements and/or the plurality of radiated requirements, the plurality of radio frequency requirements include the first radio frequency requirement, the plurality of radiated requirements include the first radiated requirement, and the first radio frequency requirement and the first radiated requirement are related to an operation time of the satellite and/or a transmit beam of the satellite.

[0025] In this implementation, because the satellite is mobile, a same satellite may correspond to a plurality of radio frequency requirements and/or a plurality of radiated requirements. A specific radio frequency requirement and/or a specific radiated requirement to be used may be determined based on a current time and a used transmit beam. This is more consistent with an actual situation, and the solution has high applicability.

[0026] According to a second aspect, this application provides a communication method. The method may be applied to a network side, for example, a terrestrial network device on the network side or a component (for example, a circuit, a chip, or a chip system) in a terrestrial network device. For example, the method is applied to a terrestrial network device. In the method, the terrestrial network device first obtains a second radiated requirement corresponding to the terrestrial network device, where the second radiated requirement is determined based on a satellite capability category of a satellite that has a coexistence relationship with the terrestrial network device, the second radiated requirement is one of a plurality of radiated requirements, each radiated requirement corresponds to one satellite capability category, a service region of the satellite overlaps a service region of the terrestrial network device, and a spacing between an operating band of the satellite and an operating band of the terrestrial network device is less than or equal to a first threshold or the operating band of the satellite overlaps the operating band of the terrestrial network device. Then, the terrestrial network device performs communication based on the second radiated requirement.

[0027] In this embodiment of this application, for the terrestrial network device, the terrestrial network device may alternatively select a corresponding radio frequency requirement and radiated requirement for constraint based

on a satellite capability category and a geographical region type, so that a coexistence requirement can be met through constraint in a coexistence scenario. It should be understood that, in the first aspect, the satellite may determine, based on the satellite capability category of the satellite, the first radio frequency requirement and/or the first radiated requirement corresponding to the satellite. In the second aspect, the terrestrial network device may determine, based on the satellite capability category of the satellite that has the coexistence relationship with the terrestrial network device, a second radio frequency requirement and/or a second radiated requirement corresponding to the terrestrial network device. Generally, a specific value of an indicator requirement corresponding to the satellite and a specific value of an indicator requirement corresponding to the terrestrial network device may be the same or different. This is not limited in this application.

[0028] In a possible implementation, obtaining the second radiated requirement corresponding to the terrestrial network device includes:

determining, based on the satellite capability category of the satellite, the second radiated requirement corresponding to the terrestrial network device.

[0029] In a possible implementation, the method further includes:

receiving the satellite capability category of the satellite.

[0030] In a possible implementation, the method further includes:

receiving the operating band of the satellite; and

sending region type information, where the region type information indicates a region type of the service region of the satellite, and the region type information is determined based on the operating band of the satellite.

[0031] In a possible implementation, the region type includes a coexistence type and a non-coexistence type.

[0032] When the service region of the satellite overlaps the service region of the terrestrial network device, and the spacing between the operating band of the satellite and the operating band of the terrestrial network device is less than or equal to the first threshold or the operating band of the satellite overlaps the operating band of the terrestrial network device, the region type of the service region of the satellite is the coexistence type.

[0033] When the service region of the satellite does not overlap the service region of the terrestrial network device, or the spacing between the operating band of the satellite and the operating band of the terrestrial network device is greater than the first threshold, the region type of the service region of the satellite is the non-coexistence type.

[0034] In a possible implementation, performing communication based on the second radiated requirement includes:

performing communication based on the second radiated requirement and a second radio frequency requirement corresponding to the terrestrial network device, where the second radio frequency requirement is a radio frequency requirement corresponding to the satellite capability category of the satellite, the second radio frequency requirement is one of a plurality of radio frequency requirements, and each radio frequency requirement corresponds to one satellite capability category.

[0035] In a possible implementation, the radiated requirement includes EIRP or EIRP density.

[0036] In a possible implementation, the radio frequency requirement includes one or more of the following:

an ACLR or ACS.

[0037] According to a third aspect, this application provides a communication apparatus. The communication apparatus includes a unit or a module configured to perform the method according to any one of the first aspect, the second aspect, or the possible implementations of any one of the first aspect or the second aspect.

[0038] According to a fourth aspect, this application provides a communication apparatus. The communication apparatus includes a processor and a transceiver. The processor and the transceiver are configured to perform the method according to any one of the first aspect, the second aspect, or the possible implementations of any one of the first aspect or the second aspect.

[0039] Optionally, the communication apparatus further includes a memory, and the memory stores a computer program. The processor and the transceiver are configured to invoke the computer program in the memory, so that the communication apparatus performs the method according to any one of the first aspect, the second aspect, or the possible implementations of any one of the first aspect or the second aspect.

[0040] In a possible design, the communication apparatus may be a chip for implementing the foregoing method or a device including a chip.

[0041] According to a fifth aspect, this application provides a communication apparatus. The communication apparatus includes a processor and an interface circuit. The interface circuit is configured to: receive a signal from a communication apparatus other than the communication apparatus and transmit the signal to the processor, or transmit a signal from the processor to a communication apparatus other than the communication apparatus. The processor is configured to implement the method according to any one of the first aspect, the second aspect, or the possible implementations of any one of the first aspect or the second aspect through a logic circuit or by executing code instructions.

[0042] According to a sixth aspect, this application provides a computer-readable storage medium. The storage medium stores a computer program or instructions. When the computer program or the instructions are executed by a computer, the method according to any one of the first aspect, the second aspect, or the possible implementations of any one of the first aspect or the second aspect is implemented.

[0043] According to a seventh aspect, this application provides a computer program product. When a computer reads and executes the computer program product, the computer is caused to perform the method according to any one of the first aspect, the second aspect, or the possible implementations of any one of the first aspect or the second aspect.

[0044] According to an eighth aspect, this application provides a chip system. The chip system includes an interface and at least one processor. The processor is configured to read and execute instructions stored in a memory. When the instructions run, the chip is caused to perform the method according to any one of the first aspect, the second aspect, or the possible implementations of any one of the first aspect or the second aspect.

[0045] According to a ninth aspect, this application provides a communication system. The communication system may include a satellite and a radio access network device (or referred to as a terrestrial network device). The satellite is configured to perform the method according to any one of the first aspect or the possible implementations of the first aspect. The radio access network device is configured to perform the method according to any one of the second aspect or the possible implementations of the second aspect.

BRIEF DESCRIPTION OF DRAWINGS

[0046] FIG. 1 is a diagram of an architecture of a communication system to which an embodiment of this application is applied;

[0047] FIG. 2 is a schematic flowchart of a communication method according to an embodiment of this application;

[0048] FIG. 3 is a diagram of a coexistence scenario according to an embodiment of this application;

[0049] FIG. 4 is a diagram of a non-coexistence scenario according to an embodiment of this application;

[0050] FIG. 5 is a diagram of another non-coexistence scenario according to an embodiment of this application;

[0051] FIG. 6 is a diagram of still another non-coexistence scenario according to an embodiment of this application;

[0052] FIG. 7 is a diagram of a radio frequency requirement corresponding to a satellite according to an embodiment of this application;

[0053] FIG. 8 is a diagram of a radio frequency requirement and a radiated requirement that correspond to a satellite according to an embodiment of this application;

[0054] FIG. 9 is another diagram of a radio frequency requirement and a radiated requirement that correspond to a satellite according to an embodiment of this application;

[0055] FIG. 10 is another schematic flowchart of a communication method according to an embodiment of this application;

[0056] FIG. 11 is a diagram of a radio frequency requirement corresponding to a terrestrial network device according to an embodiment of this application;

[0057] FIG. 12 is a diagram of a radio frequency requirement and a radiated requirement that correspond to a terrestrial network device according to an embodiment of this application;

[0058] FIG. 13 is another diagram of a radio frequency requirement and a radiated requirement that correspond to a terrestrial network device according to an embodiment of this application;

[0059] FIG. 14 is a diagram of a structure of a possible communication apparatus according to an embodiment of this application; and

[0060] FIG. 15 is a diagram of a structure of a possible communication apparatus according to an embodiment of this application.

DESCRIPTION OF EMBODIMENTS

[0061] The following clearly and completely describes the technical solutions in embodiments of this application with reference to the accompanying drawings in embodiments of this application.

[0062] In descriptions of this application, "first", "second", and the like are merely intended to distinguish between different objects but do not indicate a particular order. In addition, unless otherwise specified, "/" indicates "or". For example, A/B may indicate A or B. A term "and/or" in this specification describes only an association relationship between associated objects and indicates that there may be three relationships. For example, A and/or B may indicate the following three cases: Only A exists, both A and B exist, and only B exists. In addition, "at least one" means one or more, and "a plurality of" means two or more. At least one of the following items (pieces) or a similar expression thereof indicates any combination of these items, including a single item (piece) or any combination of a plurality of items (pieces). For example, at least one of a, b, or c may indicate a, b, c, a and b, a and c, b and c, or a, b, and c, where a, b, and c each may be singular or plural.

[0063] Terms "include", "have", and any variants thereof are intended to cover a non-exclusive inclusion. For example, processes, methods, systems, products, or devices that include a series of steps or units are not limited to listed steps or units, but instead, optionally further include steps or units that are not listed, or optionally further include

other steps or units inherent to these processes, methods, products, or devices.

[0064] In this application, the term "example" or "for example" represents giving an example, an illustration, or a description. Any embodiment or design scheme described with "example", "in an example", or "for example" in this application should not be explained as being more preferred or having more advantages than another embodiment or design scheme. Specifically, use of the term "example", "in an example", "for example", or the like is intended to present a related concept in a specific manner.

[0065] It may be understood that, in this application, "when", "if", and "provided that" all mean that an apparatus performs corresponding processing in an objective situation, are not intended to limit a time, do not mean that the apparatus is required to perform a determining action during implementation, and do not mean any other limitation.

[0066] In this application, unless otherwise specified, an element indicated in a singular form is intended to indicate "one or more", but does not indicate "one and only one".

[0067] It may be understood that in embodiments of this application, "B corresponding to A" indicates that there is a correspondence between A and B, and B may be determined based on A. Determining B based on A does not mean that B is determined based only on A. B may alternatively be determined based on A and/or other information.

[0068] To better understand embodiments of this application, the following first describes a system architecture in embodiments of this application.

[0069] FIG. 1 is a diagram of an architecture of a communication system to which an embodiment of this application is applied. It should be noted that FIG. 1 is a diagram of a possible and non-limiting system. As shown in FIG. 1, a communication system 10 includes a radio access network (radio access network, RAN) 100 and a core network (core network, CN) 200. Optionally, the communication system 10 may further include an internet 300. The RAN 100 includes at least one RAN node (for example, 110a and 110b in FIG. 1, which are collectively referred to as 110) and at least one terminal (for example, 120a to 120j in FIG. 1, which are collectively referred to as 120). The RAN 100 may further include another RAN node, for example, a wireless relay device and/or a wireless backhaul device (not shown in FIG. 1). The terminal 120 is connected to the RAN node 110 in a wireless manner. The RAN node 110 is connected to the core network 200 in a wireless or wired manner. A core network element in the core network 200 and the RAN node 110 in the RAN 100 may be different physical devices, may be a same physical device that integrates logical functions of the core network and logical functions of the radio access network, or may be one physical device that integrates some functions of the core network element and some functions of the RAN node 110. Terminals may be connected to each other in a wired or wireless manner, and RAN nodes 110 may be connected to each other in a wired or wireless manner. FIG. 1 is merely a diagram. The communication system may further include other network devices, such as a wireless relay device and a wireless backhaul device, which are not shown in FIG. 1.

[0070] The RAN 100 may be a cellular system related to the 3rd generation partnership project (3rd generation partnership project, 3GPP), for example, a 4G or 5G mobile communication system, or a future-oriented evolved system. The RAN 100 may alternatively be an open access network (open RAN, O-RAN or ORAN), a cloud radio access network (cloud radio access network, CRAN), or a wireless fidelity (wireless fidelity, Wi-Fi) system. The RAN 100 may alternatively be a communication system that integrates the foregoing two or more systems.

[0071] The RAN node 110 may also be referred to as a radio access network device, an access network device, a RAN entity, an access node, or the like sometimes, and forms a part of the communication system, to help the terminal implement radio access. A plurality of RAN nodes 110 in the communication system 10 may be nodes of a same type, or may be nodes of different types. In some scenarios, roles of the RAN node 110 and the terminal 120 are relative. For example, a network element 120i in FIG. 1 may be a helicopter or an uncrewed aerial vehicle, and may

be configured as a mobile base station. For the terminal 120j that accesses the RAN 100 through the network element 120i, the network element 120i is a base station. However, for the base station 110a, the network element 120i is a terminal. Both the RAN node 110 and the terminal 120 are sometimes referred to as communication apparatuses. For example, the network elements 110a and 110b in FIG. 1 may be understood as communication apparatuses having a base station function, and the network elements 120a to 120j may be understood as communication apparatuses having a terminal function.

[0072] In a possible scenario, the RAN node 110 may be a base station (base station), an evolved NodeB (evolved NodeB, eNodeB), an access point (access point, AP), a transmission reception point (transmission reception point, TRP), a next generation NodeB (next generation NodeB, gNB), a base station in a future mobile communication system, an access node in a Wi-Fi system, or the like. The RAN node 110 may be a macro base station (for example, 110a in FIG. 1), a micro base station or an indoor station (for example, 110b in FIG. 1), a relay node or a donor node, or a radio controller in a CRAN scenario. Optionally, the RAN node 110 may alternatively be a server, a wearable device, a vehicle, a vehicle-mounted device, or the like. For example, a radio access network device in a vehicle-to-everything (vehicle-to-everything, V2X) technology may be a road side unit (road side unit, RSU). All or a part of functions of the RAN node 110 in this application may alternatively be implemented by using a software function running on hardware, or may be implemented by using a virtualization function instantiated on a platform (for example, a cloud platform). The RAN node 110 in this application may alternatively be a logic node, a logic module, or software that can implement all or a part of functions of the RAN node 110.

[0073] In another possible scenario, a plurality of RAN nodes 110 coordinate to assist the terminal in implementing radio access, and different RAN nodes 110 separately implement a part of functions of the base station. For example, the RAN node 110 may be a central unit (central unit, CU), a distributed unit (distributed unit, DU), a CU-control plane (control plane, CP), a CU-user plane (user plane, UP), a radio unit (radio unit, RU), or the like. The CU and the DU may be separately disposed, or may be included in a same network element, for example, a baseband unit (baseband unit, BBU). The RU may be included in a radio frequency device or a radio frequency unit, for example, included in a remote radio unit (remote radio unit, RRU), an active antenna unit (active antenna unit, AAU), or a remote radio head (remote radio head, RRH).

[0074] In different systems, the CU (or the CU-CP and the CU-UP), the DU, or the RU may alternatively have different names, but a person skilled in the art may understand meanings of the names. For example, in an ORAN system, the CU may also be referred to as an O-CU (open CU), the DU may also be referred to as an O-DU, the CU-CP may also be referred to as an O-CU-CP, the CU-UP may also be referred to as an O-CU-UP, and the RU may also be referred to as an O-RU. For ease of description, the CU, the CU-CP, the CU-UP, the DU, and the RU are used as examples for description in this application. Any one of the CU (or the CU-CP or the CU-UP), the DU, or the RU in this application may be implemented by using a software module, a hardware module, or a combination of a software module and a hardware module.

[0075] The terminal may also be referred to as a terminal device, user equipment (user equipment, UE), a mobile station, a mobile terminal, or the like. The terminal may be widely used in various scenarios, for example, device-to-device (device-to-device, D2D), vehicle-to-everything (vehicle-to-everything, V2X) communication, machine-type communication (machine-type communication, MTC), internet of things (internet of things, IoT), virtual reality, augmented reality, industrial control, autonomous driving, telemedicine, smart grid, smart furniture, smart office, smart wearables, smart transportation, and smart city. The terminal may be a mobile phone, a tablet computer, a computer with a wireless transceiver function, a wearable device, a vehicle, an uncrewed aerial vehicle, a helicopter, an airplane, a ship, a robot, a robotic arm, a smart home device, or the like. A device form of the terminal is not limited

in embodiments of this application.

[0076] For ease of description, the following uses an example in which a base station serves as the RAN node 110 for description. The base station and the terminal may be stationary or mobile. The base station and the terminal may be deployed on land, including an indoor or outdoor device, a hand-held device, or a vehicle-mounted device, or may be deployed on water, or may be deployed on an airplane, a balloon, or an artificial satellite. Application scenarios of the base station and the terminal are not limited in embodiments of this application.

[0077] Roles of the base station and the terminal may be relative. For example, a helicopter or an uncrewed aerial vehicle 120i in FIG. 1 may be configured as a mobile base station, and for a terminal 120j accessing the radio access network 100 via 120i, the terminal 120i is a base station. However, for the base station 110a, 120i is a terminal. In other words, communication between 110a and 120i is performed based on a radio air interface protocol. Certainly, communication between 110a and 120i may alternatively be performed based on an interface protocol between base stations. In this case, for 110a, 120i is also a base station. Therefore, both the base station and the terminal may be collectively referred to as communication apparatuses, 110a and 110b in FIG. 1 may be referred to as communication apparatuses having a function of a base station, and 120a to 120j in FIG. 1 may be referred to as communication apparatuses having a function of a terminal.

[0078] Communication between the base station and the terminal, between base stations, or between terminals may be performed by using a licensed spectrum, or may be performed by using an unlicensed spectrum, or may be performed by using both the licensed spectrum and the unlicensed spectrum. Communication may be performed by using a spectrum below 6 gigahertz (gigahertz, GHz), or may be performed by using a spectrum above 6 GHz, or may be performed by using both the spectrum below 6 GHz and the spectrum above 6 GHz. A spectrum resource used for wireless communication is not limited in embodiments of this application.

[0079] In embodiments of this application, a function of the base station may be performed by a module (for example, a chip) in the base station, or may be performed by a control subsystem including the function of the base station. The control subsystem including the function of the base station herein may be a control center in the foregoing application scenarios such as smart grid, industrial control, smart transportation, and smart city. The function of the terminal may be performed by a module (for example, a chip or a modem) in the terminal, or may be performed by an apparatus including the function of the terminal.

[0080] In this application, the base station sends a downlink signal or downlink information to the terminal, where the downlink information is carried on a downlink channel; and the terminal sends an uplink signal or uplink information to the base station, where the uplink information is carried on an uplink channel. To communicate with the base station, the terminal needs to establish a wireless connection to a cell controlled by the base station. The cell that establishes the wireless connection to the terminal is referred to as a serving cell of the terminal. When communicating with the serving cell, the terminal is further interfered with by a signal from a neighboring cell.

[0081] Coexistence of adjacent satellite-terrestrial channels starts to be discussed in 3GPP NR R17. Coexistence of adjacent satellite-terrestrial channels means that when a service region of a satellite overlaps a service region of a terrestrial cellular network (for example, a terrestrial network device), and an operating band of the satellite is adjacent to an operating band of the terrestrial network device, radio frequency requirements of a transmit end and a receive end are constrained to limit interference from an adjacent channel, so that throughput performance of the satellite and the terrestrial network device is within an acceptable range.

[0082] A satellite capability considered in a current standard is weak. For adjacent channel coexistence, radio frequency requirements of an NTN satellite access node (satellite access node, SAN) and NTN UE are not higher than

radio frequency requirements of a TN BS and TN UE, and may be properly lowered based on a scenario. However, with emergence of high-throughput satellites, transmit capabilities of these high-throughput satellites are significantly improved compared with satellite parameters considered in an existing standard. Therefore, introduction of the high-throughput satellites may lead to a significant change in conclusions of existing coexistence scenarios, and greatly increases radio frequency requirements of the transmit end and the receive end, especially ACLR requirements of the high-throughput satellites. The ACLR requirements may even exceed an ACLR requirement of the TN BS or exceed the acceptable range of a product. In a region without terrestrial network coverage, the ACLR does not need to be strictly constrained based on a coexistence requirement. Currently, limiting interference in a coexistence scenario of an NTN and TN coverage overlapping region based on stricter ACLR requirements significantly increases hardware costs and may even make the product unfeasible.

[0083] In view of this, this application provides a communication method. A plurality of satellite capability categories and a radio frequency requirement (radio frequency requirement) and/or a radiated requirement (radiated requirement) corresponding to each satellite capability category are defined, so that a plurality of satellite-terrestrial coexistence scenarios can be better adapted, to help improve communication performance.

[0084] The following describes in detail communication methods and communication apparatuses provided in this application.

[0085] FIG. 2 is a schematic flowchart of a communication method according to an embodiment of this application. As shown in FIG. 2, the communication method may include the following steps S201 and S202. The method shown in FIG. 2 may be performed by a satellite. Alternatively, the method shown in FIG. 2 may be performed by a chip in the satellite. For ease of description, this application is mainly described by using the satellite as an execution body. It should be understood that FIG. 2 is a schematic flowchart of a method embodiment of this application, and shows detailed communication steps or operations of the method. However, these steps or operations are merely examples. Other operations or variants of various operations in FIG. 2 may be further performed in embodiments of this application. In addition, the steps in FIG. 2 may be performed in a sequence different from that shown in FIG. 2, and not all operations in FIG. 2 may be performed.

[0086] S201: The satellite obtains a first radio frequency requirement corresponding to the satellite.

[0087] In some feasible implementations, a ground gateway station may determine a radio frequency requirement that needs to be used by the satellite. Therefore, that the satellite obtains the first radio frequency requirement corresponding to the satellite may be understood as follows: The ground gateway station determines the first radio frequency requirement corresponding to the satellite, and sends first indication information to the satellite. Correspondingly, the satellite receives the first indication information, where the first indication information indicates the first radio frequency requirement corresponding to the satellite. Optionally, the first indication information may further indicate information such as a first radiated requirement corresponding to the satellite, a beam identifier, and a beam coverage area.

[0088] In some feasible implementations, the satellite may alternatively determine a radio frequency requirement that needs to be used by the satellite. Therefore, an implementation in which the satellite obtains the first radio frequency requirement corresponding to the satellite may be as follows: The satellite determines the first radio frequency requirement based on a satellite capability category of the satellite and a first correspondence. The first correspondence herein is a correspondence between a satellite capability category and a radio frequency requirement. The first correspondence may be predefined, preconfigured, or configured. One satellite capability category may correspond to one or more radio frequency requirements, and one radio frequency requirement may usually correspond

to one satellite capability category. Alternatively, another implementation in which the satellite obtains the first radio frequency requirement corresponding to the satellite may be as follows: The satellite determines the first radio frequency requirement based on the satellite capability category of the satellite and a region type of a service region of the satellite. Specifically, determining the first radio frequency requirement based on the satellite capability category of the satellite and the region type of the service region of the satellite may be understood as follows: The satellite determines the first radio frequency requirement based on the satellite capability category of the satellite, the region type of the service region of the satellite, and a second correspondence. The second correspondence herein is a correspondence between a satellite capability category, a region type, and a radio frequency requirement. In other words, the radio frequency requirement is related to the satellite capability category and the region type. The second correspondence may be predefined, preconfigured, or configured. This is not limited.

[0089] Optionally, in addition to determining the radiated requirement that needs to be used, the satellite may further determine a radiated requirement corresponding to the satellite (the radiated requirement corresponding to the satellite is referred to as the first radiated requirement below). Specifically, the satellite may determine the first radiated requirement based on the satellite capability category of the satellite and a third correspondence. The third correspondence herein is a correspondence between a satellite capability category and a radiated requirement. One satellite capability category may correspond to one or more radiated requirements, and one radiated requirement usually corresponds to one satellite capability category. Alternatively, the satellite may determine the first radiated requirement based on the satellite capability category of the satellite and the region type of the service region of the satellite. Specifically, determining the first radiated requirement based on the satellite capability category of the satellite and the region type of the service region of the satellite may be understood as follows: The satellite determines the first radiated requirement based on the satellite capability category of the satellite, the region type of the service region of the satellite, and a fourth correspondence. The fourth correspondence herein is a correspondence between a satellite capability category, a region type, and a radiated requirement. In other words, the radiated requirement is related to the satellite capability category and the region type.

[0090] The region type includes a coexistence type and a non-coexistence type. Generally, when the service region of the satellite overlaps a service region of a terrestrial network device, and a spacing between an operating band of the satellite and an operating band of the terrestrial network device is less than or equal to a first threshold or the operating band of the satellite overlaps the operating band of the terrestrial network device, the region type of the service region of the satellite is the coexistence type. When the service region of the satellite does not overlap the service region of the terrestrial network device, or the spacing between the operating band of the satellite and the operating band of the terrestrial network device is greater than the first threshold, the region type of the service region of the satellite is the non-coexistence type. For example, FIG. 3 is a diagram of a coexistence scenario according to an embodiment of this application. As shown in FIG. 3, it is assumed that the operating band of the terrestrial network device is (a1, a2), and the operating band of the satellite is (a3, a4). In the coexistence scenario, the spacing between the operating band of the satellite and the operating band of the terrestrial network device is less than or equal to the first threshold (as shown in (1) in FIG. 3) or the operating band of the satellite overlaps the operating band of the terrestrial network device (as shown in (2) in FIG. 3), and the service region of the satellite overlaps the service region of the terrestrial network device. FIG. 4, FIG. 5, and FIG. 6 are diagrams of three non-coexistence scenarios respectively. In the non-coexistence scenario, the service region of the satellite does not overlap the service region of the terrestrial network device, or the spacing between the operating band of the satellite and the operating band of the terrestrial network device is greater than the first threshold.

[0091] Optionally, when the satellite independently determines the radio frequency requirement that needs to

be used by the satellite, and the radio frequency requirement is related to the satellite capability category and the region type, the terrestrial network device may indicate, to the satellite, a region type of a current service region of the satellite. Specifically, the satellite may send the operating band of the satellite to the terrestrial network device (optionally, the satellite may further send information about the service region of the satellite to the terrestrial network device). Correspondingly, after the terrestrial network device receives the operating band of the satellite, the terrestrial network device may determine region type information based on the operating band and the service region of the satellite and the operating band and the service region of the terrestrial network device, and feed back the region type information to the satellite. The region type information indicates the region type of the service region of the satellite.

[0092] Optionally, the satellite may alternatively determine the region type of the current service region of the satellite. Specifically, the terrestrial network device may send the operating band of the terrestrial network device to the satellite (optionally, the terrestrial network device may further send information about the service region of the terrestrial network device to the satellite). Correspondingly, after the satellite receives the operating band of the terrestrial network device, the satellite may determine the region type of the service region of the satellite based on the operating band and the service region of the terrestrial network device and the operating band and the service region of the satellite.

[0093] It should be understood that the first radio frequency requirement is a radio frequency requirement corresponding to the satellite capability category of the satellite, and the first radio frequency requirement is one of a plurality of radio frequency requirements. Generally, one satellite corresponds to one satellite capability category, and different satellite capability categories correspond to different radio frequency requirements. Alternatively, it is understood as that each radio frequency requirement corresponds to one satellite capability category. The radio frequency requirement includes one or more of an ACLR, ACS, or the like. For ease of description, the following mainly uses an example in which the radio frequency requirement includes an ACLR and ACS.

[0094] The radio frequency requirements corresponding to the different satellite capability categories may be specifically understood as that the radio frequency requirements corresponding to the different satellite capability categories are completely different, or the radio frequency requirements corresponding to the different satellite capability categories are partially different. For example, it is assumed that the satellite capability category includes a first satellite capability category and a second satellite capability category, the first satellite capability category corresponds to ACLR1 and ACS1, and the second satellite capability category corresponds to ACLR2 and ACS2. At least one of (ACLR1 and ACLR2) or (ACS1 and ACS2) are different. In other words, that different satellite capability categories correspond to different radio frequency requirements may be any one of the following three cases: 1. ACLR1≠ACLR2, and ACS1=ACS2; 2. ACLR1=ACLR2, and ACS1≠ACS2; and 3. ACLR1≠ACLR2, and ACS1≠ACS2.

[0095] Optionally, the first satellite capability category may be a high capability category, and the second satellite capability category may be a low capability category. For example, a satellite that can provide only low-throughput services such as a basic voice service or a short message service is a satellite of a low capability category, including satellites configured in set 1 and set 2 in an existing standard. For example, EIRP density of a set-1 satellite may reach 34 dBw/MHz, and EIRP density of a set-2 satellite may reach 28 dBw/MHz. Correspondingly, a satellite that can provide high-throughput services such as a high-definition video service is a satellite of a high capability category. For example, currently, EIRP density of a satellite providing a high-throughput service may reach 51 dBw/MHz or 46.8 dBw/MHz. This is not limited. In other words, different satellite capability categories may be defined based on transmit capabilities of satellites or service types that can be provided by the satellites.

[0096] Similarly, the first radiated requirement is a radiated requirement corresponding to the satellite capability

category of the satellite, and the first radiated requirement is one of a plurality of radiated requirements. Generally, different satellite capability categories correspond to different radiated requirements. Alternatively, it is understood as that each radiated requirement corresponds to one satellite capability category. The radiated requirement includes one or more of EIRP, EIRP density, or the like. For ease of description, the following mainly uses an example in which the radiated requirement is EIRP density.

[0097] For example, FIG. 7 is a diagram of a radio frequency requirement corresponding to a satellite according to an embodiment of this application. As shown in FIG. 7, an example in which the satellite capability category includes a first satellite capability category and a second satellite capability category, and the radio frequency requirement includes an ACLR and ACS is used. For a satellite, values of an ACLR and ACS that correspond to a satellite of the first satellite capability category are respectively V1 and U1, and values of an ACLR and ACS that correspond to a satellite of the second satellite capability category are respectively V2 and U2. At least one of the following conditions is met: V1≠V2 and U1≠U2.

[0098] For another example, FIG. 8 is a diagram of a radio frequency requirement and a radiated requirement that correspond to a satellite according to an embodiment of this application. As shown in FIG. 8, it is assumed that a first satellite capability category is higher than a second satellite capability category. For a satellite, when a satellite capability category is the first satellite capability category, an indicator requirement of the satellite may be constrained by combining a radio frequency requirement and a radiated requirement. Specifically, values of an ACLR, ACS, and EIRP density that correspond to a satellite of the first satellite capability category are respectively V1, U1, and W1, and values of an ACLR and ACS that correspond to a satellite of the second satellite capability category are respectively V2 and U2. At least one of the following conditions is met: V1≠V2 and U1≠U2.

[0099] For another example, FIG. 9 is another diagram of a radio frequency requirement and a radiated requirement that correspond to a satellite according to an embodiment of this application. As shown in FIG. 9, in addition to a plurality of satellite capability categories, a plurality of region types are further defined, and different radio frequency requirements or different radio frequency requirements and radiated requirements are separately defined based on the satellite capability categories and the region types. For example, two region types are defined. One region type is a coexistence type, and the other region type is a non-coexistence type. When a satellite capability category of a satellite is a first satellite capability category and the satellite is in a region of the coexistence type, the satellite needs to be constrained by combining a radio frequency requirement and a radiated requirement. Specifically, when a satellite capability category of a satellite is a first satellite capability category and the satellite is in a region of the coexistence type, values of an ACLR, ACS, and EIRP density of the corresponding satellite are respectively V11, U11, and W11; when a satellite capability category of a satellite is the first satellite capability category and the satellite is in a region of the non-coexistence type, values of an ACLR and ACS of the corresponding satellite are respectively V12 and U12; when a satellite capability category of a satellite is a second satellite capability category and the satellite is in the region of the coexistence type, values of an ACLR and ACS of the corresponding satellite are respectively V21 and U21; and when a satellite capability category of a satellite is the second satellite capability category and the satellite is in the region of the non-coexistence type, values of an ACLR and ACS of the corresponding satellite are respectively V22 and U22.

[00100] Optionally, for a same satellite capability category, subcategories of the category may be further defined, and different radio frequency requirements are separately defined. The first satellite capability category is used as an example. Based on ephemeris information of the satellite, for example, an orbital altitude of the satellite and a communication elevation angle of the satellite, the first satellite capability category is further classified into a first satellite capability category 1 and a first satellite capability category 2. The first satellite capability category 1

corresponds to ACLR1-1 and ACS1-1, and the first satellite capability category 2 corresponds to ACLR1-2 and ACS1-2.

[00101] It should be understood that one satellite capability category may correspond to one or more radio frequency requirements. When the satellite capability category corresponding to the satellite corresponds to a plurality of radio frequency requirements, the plurality of radio frequency requirements include the first radio frequency requirement, and the first radio frequency requirement is related to an operation time of the satellite and/or a transmit beam of the satellite.

[00102] S202: The satellite performs communication based on the first radio frequency requirement.

[00103] In some feasible implementations, the satellite may communicate with a communication device based on the first radio frequency requirement, or the satellite may communicate with the communication device based on the first radio frequency requirement and the first radiated requirement. For example, the satellite may communicate with a terminal, or may communicate with a ground gateway station or a terrestrial network device. This is not limited in this application. For the satellite, the satellite needs to perform communication by using communication parameters greater than or equal to the first radio frequency requirement, and/or communication parameters less than or equal to the first radiated requirement.

[00104] In this embodiment of this application, different radio frequency requirements or different radio frequency requirements and radiated requirements are defined based on satellites of different satellite capability categories, to better adapt to a plurality of satellite-terrestrial coexistence scenarios. Specifically, communication parameters of the satellite are constrained by combining the radio frequency requirement and the radiated requirement, so that characteristics of a high-capability satellite can be better adapted, and requirements of hardware costs, product capabilities, and coexistence scenarios are met. For a low-capability satellite, the radio frequency requirement may be used for constraint. In addition, a plurality of satellite capability categories and region types may be further defined in the standard, and a plurality of radio frequency requirements or a plurality of radio frequency requirements and radiated requirements are defined based on the satellite capability categories and region types. Specifically, for the high-capability satellite, a higher radio frequency requirement and a lower radiated requirement are allowed in a non-coexistence region, so that the satellite can provide better quality of service, and a stricter radio frequency requirement and a stricter radiated requirement are required in a coexistence region, to ensure system capabilities in a coexistence scenario, so as to better adapt to characteristics of the high-capability satellite and geographical regions. For the low-capability satellite, different radio frequency requirements may be used for constraint in the coexistence region and the non-coexistence region.

[00105] FIG. 10 is another schematic flowchart of a communication method according to an embodiment of this application. As shown in FIG. 10, the communication method may include the following steps S1001 and S1002. The method shown in FIG. 10 may be performed by a terrestrial network device. Alternatively, the method shown in FIG. 10 may be performed by a chip in the terrestrial network device. For ease of description, this application is mainly described by using the terrestrial network device as an execution body. It should be understood that FIG. 10 is a schematic flowchart of a method embodiment of this application, and shows detailed communication steps or operations of the method. However, these steps or operations are merely examples. Other operations or variants of various operations in FIG. 10 may be further performed in embodiments of this application. In addition, the steps in FIG. 10 may be performed in a sequence different from that shown in FIG. 10, and not all operations in FIG. 10 may be performed.

[00106] S1001: The terrestrial network device obtains a second radiated requirement corresponding to the

terrestrial network device.

[00107] It should be understood that, for the terrestrial network device, different radiated requirements and/or different radio frequency requirements corresponding to the terrestrial network device may be defined. Specifically, the terrestrial network device may determine a region type of a service region of the terrestrial network device based on an obtained operating band and service region of a satellite and an operating band and a service region of the terrestrial network device. If the region type is a coexistence type, the terrestrial network device may determine, based on an obtained satellite capability category, a radiated requirement corresponding to the terrestrial network device (the radiated requirement corresponding to the terrestrial network device is referred to as the second radiated requirement below). If the region type is a non-coexistence type, the radiated requirement corresponding to the terrestrial network device is not related to the satellite capability category. Generally, when the service region of the satellite overlaps the service region of the terrestrial network device, and a spacing between the operating band of the satellite and the operating band of the terrestrial network device is less than or equal to a first threshold or the operating band of the satellite overlaps the operating band of the terrestrial network device, the region type of the service region of the terrestrial network device is the coexistence type (in other words, there is a coexistence relationship between the terrestrial network device and the satellite); or when the service region of the satellite does not overlap the service region of the terrestrial network device, or the spacing between the operating band of the satellite and the operating band of the terrestrial network device is greater than the first threshold, the region type of the service region of the terrestrial network device is the non-coexistence type (in other words, there is no coexistence relationship between the terrestrial network device and the satellite).

[00108] Optionally, in addition to determining the second radiated requirement that needs to be used by the terrestrial network device, the terrestrial network device may further determine a radio frequency requirement that needs to be used by the terrestrial network device (for ease of description, the radio frequency requirement corresponding to the terrestrial network device is referred to as a second radio frequency requirement below). The second radio frequency requirement is a radio frequency requirement corresponding to the satellite capability category of the satellite, the second radio frequency requirement is one of a plurality of radio frequency requirements, and each radio frequency requirement corresponds to one satellite capability category.

[00109] For example, FIG. 11 is a diagram of a radio frequency requirement corresponding to a terrestrial network device according to an embodiment of this application. As shown in FIG. 11, an example in which the satellite capability category includes a first satellite capability category and a second satellite capability category, and the radio frequency requirement includes an ACLR and ACS is used. For a terrestrial network device, when the terrestrial network device coexists with a satellite of the first satellite capability category, values of an ACLR and ACS of the corresponding terrestrial network device are respectively X1 and Y1, and when the terrestrial network device coexists with a satellite of the second satellite capability category, values of an ACLR and ACS of the corresponding terrestrial network device are respectively X2 and Y2. At least one of the following conditions is met: $X1 \neq X2$ and $Y1 \neq Y2$.

[00110] For another example, FIG. 12 is a diagram of a radio frequency requirement and a radiated requirement that correspond to a terrestrial network device according to an embodiment of this application. As shown in FIG. 12, it is assumed that a first satellite capability category is higher than a second satellite capability category. For a terrestrial network device, when the terrestrial network device coexists with a satellite of the first satellite capability category, an indicator requirement of the terrestrial network device may be constrained by combining a radio frequency requirement and a radiated requirement. Specifically, when the terrestrial network device coexists with a satellite of the first satellite capability category, values of an ACLR, ACS, and EIRP density of the corresponding terrestrial network device are respectively X1, Y1, and Z1, and when the terrestrial network device coexists with a

satellite of the second satellite capability category, values of an ACLR and ACS of the corresponding terrestrial network device are respectively X2 and Y2. At least one of the following conditions is met: X1≠X2 and Y1≠Y2.

[00111] For another example, FIG. 13 is another diagram of a radio frequency requirement and a radiated requirement that correspond to a terrestrial network device according to an embodiment of this application. As shown in FIG. 13, in addition to a plurality of satellite capability categories, a plurality of region types are further defined, and different radio frequency requirements or different radio frequency requirements and radiated requirements are separately defined based on the satellite capability categories and the region types. For example, two region types are defined. One region type is a coexistence type, and the other region type is a non-coexistence type. When a satellite capability category of a satellite is the first satellite capability category and the satellite is in a region of the coexistence type, the terrestrial network device needs to be constrained by combining a radio frequency requirement and a radiated requirement. Specifically, when a satellite capability category of a satellite is a first satellite capability category and the satellite is in a region of the coexistence type, values of an ACLR, ACS, and EIRP density of the corresponding terrestrial network device are respectively X11, Y11, and Z11; when a satellite capability category of a satellite is a second satellite capability category and the satellite is in the region of the coexistence type, values of an ACLR and ACS of the corresponding terrestrial network device are respectively X21 and Y21; and when a satellite is in a region of the non-coexistence type, values of an ACLR and ACS of the corresponding terrestrial network device are respectively X3 and Y3.

[00112] Optionally, for a same satellite capability category, subcategories of the category may be further defined, and different radio frequency requirements are separately defined.

[00113] Optionally, information such as the operating band of the satellite, the service region of the satellite, and the satellite capability category of the satellite may be from the satellite, a ground gateway station, or the like. This is not limited in this application.

[00114] S1002: The terrestrial network device performs communication based on the second radiated requirement.

[00115] In a coexistence scenario, the terrestrial network device may communicate with a communication device based on the second radiated requirement, or the terrestrial network device may communicate with the communication device based on the second radio frequency requirement and the second radiated requirement. For example, the terrestrial network device may communicate with a terminal, or may communicate with the ground gateway station or a terrestrial network device. This is not limited in this application. For the terrestrial network device, the terrestrial network device needs to perform communication by using communication parameters greater than or equal to the second radio frequency requirement, and/or communication parameters less than or equal to the second radiated requirement.

[00116] In this embodiment of this application, for the terrestrial network device, the terrestrial network device may alternatively select a corresponding radio frequency requirement and radiated requirement for constraint based on a satellite capability category and a geographical region type, so that a coexistence requirement can be met through constraint in the coexistence scenario.

[00117] The following describes in detail communication apparatuses provided in this application with reference to FIG. 14 and FIG. 15.

[00118] It may be understood that, to implement functions in the foregoing embodiments, the communication apparatus includes corresponding hardware structures and/or software modules for performing the functions. A person skilled in the art should be easily aware that, in combination with the units and the method steps in the examples

described in embodiments disclosed in this application, this application can be implemented by using hardware or a combination of hardware and computer software. Whether a function is performed by hardware or hardware driven by computer software depends on particular application scenarios and design constraints of the technical solutions.

[00119] FIG. 14 and FIG. 15 are diagrams of structures of possible communication apparatuses according to embodiments of this application. These communication apparatuses may be configured to implement functions of the satellite or the radio access network device (or referred to as a terrestrial network device, for example, a base station) in the foregoing method embodiments, and therefore can implement beneficial effects of the foregoing method embodiments. In embodiments of this application, the communication apparatus may be a satellite or a radio access network device, or may be a module (for example, a chip) used in a satellite or a radio access network device.

[00120] As shown in FIG. 14, a communication apparatus 1400 includes a processing unit 1410 and a transceiver unit 1420. The communication apparatus 1400 is configured to implement functions of the satellite or the radio access network device in the method embodiment shown in FIG. 2 or FIG. 10.

[00121] When the communication apparatus 1400 is configured to implement the functions of the satellite in the method embodiment shown in FIG. 2,

the processing unit 1410 is configured to obtain a first radio frequency requirement corresponding to the satellite, where the first radio frequency requirement is a radio frequency requirement corresponding to a satellite capability category of the satellite, the first radio frequency requirement is one of a plurality of radio frequency requirements, and each radio frequency requirement corresponds to one satellite capability category; and the transceiver unit 1420 is configured to perform communication based on the first radio frequency requirement.

[00122] In a possible implementation, when obtaining the first radio frequency requirement corresponding to the satellite, the processing unit 1410 is configured to:

receive first indication information via the transceiver unit 1420, where the first indication information indicates the first radio frequency requirement corresponding to the satellite.

[00123] In a possible implementation, when obtaining the first radio frequency requirement corresponding to the satellite, the processing unit 1410 is configured to:

determine the first radio frequency requirement based on the satellite capability category of the satellite and a first correspondence, where the first correspondence is a correspondence between a satellite capability category and a radio frequency requirement.

[00124] In a possible implementation, when obtaining the first radio frequency requirement corresponding to the satellite, the processing unit 1410 is configured to:

determine the first radio frequency requirement based on the satellite capability category of the satellite and a region type of a service region of the satellite.

[00125] In a possible implementation, when determining the first radio frequency requirement based on the satellite capability category of the satellite and the region type of the service region of the satellite, the processing unit 1410 is configured to:

determine the first radio frequency requirement based on the satellite capability category of the satellite, the region type of the service region of the satellite, and a second correspondence, where the second correspondence is a correspondence between a satellite capability category, a region type, and a radio frequency requirement.

[00126] In a possible implementation, the region type includes a coexistence type and a non-coexistence type.

[00127] When the service region of the satellite overlaps a service region of a terrestrial network device, and a spacing between an operating band of the satellite and an operating band of the terrestrial network device is less than

or equal to a first threshold or the operating band of the satellite overlaps the operating band of the terrestrial network device, the region type of the service region of the satellite is the coexistence type.

[00128] When the service region of the satellite does not overlap the service region of the terrestrial network device, or the spacing between the operating band of the satellite and the operating band of the terrestrial network device is greater than the first threshold, the region type of the service region of the satellite is the non-coexistence type.

[00129] In a possible implementation, the transceiver unit 1420 is further configured to:

receive region type information, where the region type information indicates the region type of the service region of the satellite.

[00130] In a possible implementation, the transceiver unit 1420 is further configured to:

send the operating band of the satellite, where the operating band of the satellite is used to determine the region type information.

[00131] In a possible implementation, the radio frequency requirement includes one or more of the following:

an adjacent channel leakage ratio ACLR or adjacent channel selectivity ACS.

[00132] In a possible implementation, when performing communication based on the first radio frequency requirement, the transceiver unit 1420 is configured to:

perform communication based on the first radio frequency requirement and a first radiated requirement corresponding to the satellite, where the first radiated requirement is one of a plurality of radiated requirements, and each radiated requirement corresponds to one satellite capability category.

[00133] In a possible implementation, the radiated requirement includes effective isotropic radiated power EIRP or EIRP density.

[00134] In a possible implementation, the satellite corresponds to the plurality of radio frequency requirements and/or the plurality of radiated requirements, the plurality of radio frequency requirements include the first radio frequency requirement, the plurality of radiated requirements include the first radiated requirement, and the first radio frequency requirement and the first radiated requirement are related to an operation time of the satellite and/or a transmit beam of the satellite.

[00135] When the communication apparatus 1400 is configured to implement the functions of the radio access network device in the method embodiment shown in FIG. 10,

the processing unit 1410 is configured to obtain a second radiated requirement corresponding to a terrestrial network device, where the second radiated requirement is determined based on a satellite capability category of a satellite that has a coexistence relationship with the terrestrial network device, the second radiated requirement is one of a plurality of radiated requirements, each radiated requirement corresponds to one satellite capability category, a service region of the satellite overlaps a service region of the terrestrial network device, and a spacing between an operating band of the satellite and an operating band of the terrestrial network device is less than or equal to a first threshold or the operating band of the satellite overlaps the operating band of the terrestrial network device; and the transceiver unit 1420 is configured to perform communication based on the second radiated requirement.

[00136] In a possible implementation, when obtaining the second radiated requirement corresponding to the terrestrial network device, the processing unit 1410 is configured to:

determine, based on the satellite capability category of the satellite, the second radiated requirement corresponding to the terrestrial network device.

[00137] In a possible implementation, the transceiver unit 1420 is further configured to:

receive the satellite capability category of the satellite.

[00138] In a possible implementation, the transceiver unit 1420 is further configured to:

receive the operating band of the satellite; and

send region type information, where the region type information indicates a region type of the service region of the satellite, and the region type information is determined based on the operating band of the satellite.

[00139] In a possible implementation, the region type includes a coexistence type and a non-coexistence type.

[00140] When the service region of the satellite overlaps the service region of the terrestrial network device, and the spacing between the operating band of the satellite and the operating band of the terrestrial network device is less than or equal to the first threshold or the operating band of the satellite overlaps the operating band of the terrestrial network device, the region type of the service region of the satellite is the coexistence type.

[00141] When the service region of the satellite does not overlap the service region of the terrestrial network device, or the spacing between the operating band of the satellite and the operating band of the terrestrial network device is greater than the first threshold, the region type of the service region of the satellite is the non-coexistence type.

[00142] In a possible implementation, when performing communication based on the second radiated requirement, the transceiver unit 1420 is configured to:

perform communication based on the second radiated requirement and a second radio frequency requirement corresponding to the terrestrial network device, where the second radio frequency requirement is a radio frequency requirement corresponding to the satellite capability category of the satellite, the second radio frequency requirement is one of a plurality of radio frequency requirements, and each radio frequency requirement corresponds to one satellite capability category.

[00143] In a possible implementation, the radiated requirement includes effective isotropic radiated power EIRP or EIRP density.

[00144] In a possible implementation, the radiated requirement includes one or more of the following:

an adjacent channel leakage ratio ACLR or adjacent channel selectivity ACS.

[00145] For more detailed descriptions of the processing unit 1410 and the transceiver unit 1420, refer to the related descriptions in the method embodiment shown in FIG. 2 or FIG. 10.

[00146] As shown in FIG. 15, a communication apparatus 1500 includes a processor 1510 and an interface circuit 1520. The processor 1510 and the interface circuit 1520 are coupled to each other. It may be understood that the interface circuit 1520 may be a transceiver or an input/output interface. Optionally, the communication apparatus 1500 may further include a memory 1530, configured to: store instructions executed by the processor 1510, or store input data required by the processor 1510 to run the instructions, or store data generated after the processor 1510 runs the instructions.

[00147] When the communication apparatus 1500 is configured to implement the method shown in FIG. 2 or FIG. 10, the processor 1510 is configured to implement the functions of the processing unit 1410, and the interface circuit 1520 is configured to implement the functions of the transceiver unit 1420.

[00148] When the communication apparatus is a chip used in a satellite, the chip in the satellite implements functions of the satellite in the foregoing method embodiments. The chip in the satellite receives, via another module (for example, a radio frequency module or an antenna) in the satellite, information sent by a radio access network device to the satellite; or the chip in the satellite sends information to another module (for example, a radio frequency module or an antenna) in the satellite, where the information is sent by the satellite to a radio access network device.

[00149] When the communication apparatus is a module used in a radio access network device, the module in the radio access network device implements functions of the radio access network device in the foregoing method embodiments. The module in the radio access network device receives information from another module (for example, a radio frequency module or an antenna) in the radio access network device, where the information is sent by a satellite to the radio access network device; or the module in the radio access network device sends information to another module (for example, a radio frequency module or an antenna) in the radio access network device, where the information is sent by the radio access network device to a satellite. The module in the radio access network device herein may be a baseband chip in the radio access network device, may be a CU, a DU, or another module, or may be an apparatus in an open radio access network (open radio access network, O-RAN) architecture, for example, an apparatus like an open CU or an open DU.

[00150] It may be understood that, the processor in embodiments of this application may be a central processing unit (central processing unit, CPU), or may be another general-purpose processor, a digital signal processor (digital signal processor, DSP), an application-specific integrated circuit (application-specific integrated circuit, ASIC), a field programmable gate array (field programmable gate array, FPGA) or another programmable logic device, a transistor logic device, a hardware component, or any combination thereof. The general-purpose processor may be a microprocessor or any conventional processor.

[00151] The method steps in embodiments of this application may be implemented in hardware, or may be implemented in software instructions that may be executed by the processor. The software instructions may include a corresponding software module. The software module may be stored in a random access memory, a flash memory, a read-only memory, a programmable read-only memory, an erasable programmable read-only memory, an electrically erasable programmable read-only memory, a register, a hard disk, a removable hard disk, a CD-ROM, or any other form of storage medium well-known in the art. For example, a storage medium is coupled to the processor, so that the processor can read information from the storage medium and write information into the storage medium. The storage medium may alternatively be a part of the processor. The processor and the storage medium may be located in an ASIC. In addition, the ASIC may be located in the radio access network device or the satellite. The processor and the storage medium may alternatively exist in the radio access network device or the satellite as discrete components.

[00152] All or a part of the foregoing embodiments may be implemented by using software, hardware, firmware, or any combination thereof. When software is used to implement the embodiments, all or a part of the embodiments may be implemented in a form of computer program product. The computer program product includes one or more computer programs or instructions. When the computer programs or the instructions are loaded and executed on a computer, the procedures or functions in embodiments of this application are all or partially executed. The computer may be a general-purpose computer, a dedicated computer, a computer network, a network device, user equipment, or another programmable apparatus. The computer program or instructions may be stored in a computer-readable storage medium, or may be transmitted from a computer-readable storage medium to another computer-readable storage medium. For example, the computer program or instructions may be transmitted from a website, computer, server, or data center to another website, computer, server, or data center in a wired or wireless manner. The computer-readable storage medium may be any usable medium that can be accessed by the computer, or a data storage device, for example, a server or a data center, integrating one or more usable media. The usable medium may be a magnetic medium, for example, a floppy disk, a hard disk, or a magnetic tape; or may be an optical medium, for example, a digital video disc; or may be a semiconductor medium, for example, a solid-state drive. The computer-readable storage medium may be a volatile storage medium or a nonvolatile storage medium, or may include both a volatile storage medium and a nonvolatile storage medium.

[00153] In various embodiments of this application, unless otherwise stated or if there is a logic conflict, terms and/or descriptions in different embodiments are consistent and may be mutually referenced, and technical features in different embodiments may be combined into a new embodiment based on an internal logical relationship thereof.

[00154] It may be understood that various numbers in embodiments of this application are merely used for differentiation for ease of description, and are not used to limit the scope of embodiments of this application. Sequence numbers of the foregoing processes do not mean an execution sequence, and the execution sequence of the processes should be determined based on functions and internal logic of the processes.

CLAIMS

1. A communication method, comprising:

obtaining a first radio frequency requirement corresponding to a satellite, wherein the first radio frequency requirement is a radio frequency requirement corresponding to a satellite capability category of the satellite, the first radio frequency requirement is one of a plurality of radio frequency requirements, and each radio frequency requirement corresponds to one satellite capability category; and

performing communication based on the first radio frequency requirement.

2. The method according to claim 1, wherein obtaining the first radio frequency requirement corresponding to the satellite comprises:

receiving first indication information, wherein the first indication information indicates the first radio frequency requirement corresponding to the satellite.

3. The method according to claim 1, wherein obtaining the first radio frequency requirement corresponding to the satellite comprises:

determining the first radio frequency requirement based on the satellite capability category of the satellite and a first correspondence, wherein the first correspondence is a correspondence between a satellite capability category and a radio frequency requirement.

4. The method according to claim 1, wherein obtaining the first radio frequency requirement corresponding to the satellite comprises:

determining the first radio frequency requirement based on the satellite capability category of the satellite and a region type of a service region of the satellite.

5. The method according to claim 4, wherein determining the first radio frequency requirement based on the satellite capability category of the satellite and the region type of the service region of the satellite comprises:

determining the first radio frequency requirement based on the satellite capability category of the satellite, the region type of the service region of the satellite, and a second correspondence, wherein the second correspondence is a correspondence between a satellite capability category, a region type, and a radio frequency requirement.

6. The method according to claim 4 or 5, wherein the region type comprises a coexistence type and a non-coexistence type; and

when the service region of the satellite overlaps a service region of the terrestrial network device, and a spacing between an operating band of the satellite and an operating band of the terrestrial network device is less than or equal to a first threshold or the operating band of the satellite overlaps the operating band of the terrestrial network device, the region type of the service region of the satellite is the coexistence type; or

when the service region of the satellite does not overlap the service region of the terrestrial network device, or the spacing between the operating band of the satellite and the operating band of the terrestrial network device is greater than the first threshold, the region type of the service region of the satellite is the non-coexistence type.

7. The method according to any one of claims 4 to 6, wherein the method further comprises:

receiving region type information, wherein the region type information indicates the region type of the service region of the satellite.

8. The method according to claim 7, wherein the method further comprises:

sending the operating band of the satellite, wherein the operating band of the satellite is used to determine the region type information.

9. The method according to any one of claims 1 to 8, wherein the radio frequency requirement comprises one or

more of the following:

an adjacent channel leakage ratio ACLR or adjacent channel selectivity ACS.

10. The method according to any one of claims 1 to 8, wherein performing communication based on the first radio frequency requirement comprises:

performing communication based on the first radio frequency requirement and a first radiated requirement corresponding to the satellite, wherein the first radiated requirement is one of a plurality of radiated requirements, and each radiated requirement corresponds to one satellite capability category.

11. The method according to claim 10, wherein the radiated requirement comprises effective isotropic radiated power EIRP or EIRP density.

12. The method according to claim 10 or 11, wherein the satellite corresponds to the plurality of radio frequency requirements and/or the plurality of radiated requirements, the plurality of radio frequency requirements comprise the first radio frequency requirement, the plurality of radiated requirements comprise the first radiated requirement, and the first radio frequency requirement and the first radiated requirement are related to an operation time of the satellite and/or a transmit beam of the satellite.

13. A communication method, comprising:

obtaining a second radiated requirement corresponding to a terrestrial network device, wherein the second radiated requirement is determined based on a satellite capability category of a satellite that has a coexistence relationship with the terrestrial network device, the second radiated requirement is one of a plurality of radiated requirements, each radiated requirement corresponds to one satellite capability category, a service region of the satellite overlaps a service region of the terrestrial network device, and a spacing between an operating band of the satellite and an operating band of the terrestrial network device is less than or equal to a first threshold or the operating band of the satellite overlaps the operating band of the terrestrial network device; and

performing communication based on the second radiated requirement.

14. The method according to claim 13, wherein obtaining the second radiated requirement corresponding to the terrestrial network device comprises:

determining, based on the satellite capability category of the satellite, the second radiated requirement corresponding to the terrestrial network device.

15. The method according to claim 14, wherein the method further comprises:

receiving the satellite capability category of the satellite.

16. The method according to any one of claims 13 to 15, wherein the method further comprises:

receiving the operating band of the satellite; and

sending region type information, wherein the region type information indicates a region type of the service region of the satellite, and the region type information is determined based on the operating band of the satellite.

17. The method according to claim 16, wherein the region type comprises a coexistence type and a non-coexistence type; and

when the service region of the satellite overlaps the service region of the terrestrial network device, and the spacing between the operating band of the satellite and the operating band of the terrestrial network device is less than or equal to the first threshold or the operating band of the satellite overlaps the operating band of the terrestrial network device, the region type of the service region of the satellite is the coexistence type; or

when the service region of the satellite does not overlap the service region of the terrestrial network device, or the spacing between the operating band of the satellite and the operating band of the terrestrial network device is greater than the first threshold, the region type of the service region of the satellite is the non-coexistence type.

18. The method according to any one of claims 13 to 17, wherein performing communication based on the second radiated requirement comprises:

performing communication based on the second radiated requirement and a second radio frequency requirement corresponding to the terrestrial network device, wherein the second radio frequency requirement is a radio frequency requirement corresponding to the satellite capability category of the satellite, the second radio frequency requirement is one of a plurality of radio frequency requirements, and each radio frequency requirement corresponds to one satellite capability category.

19. The method according to claim 18, wherein the radiated requirement comprises effective isotropic radiated power EIRP or EIRP density.

20. The method according to any one of claims 13 to 19, wherein the radio frequency requirement comprises one or more of the following:

an adjacent channel leakage ratio ACLR or adjacent channel selectivity ACS.

21. A communication apparatus, comprising a unit or a module configured to perform the method according to any one of claims 1 to 12, or comprising a unit or a module configured to perform the method according to any one of claims 13 to 20.

22. A communication apparatus, comprising a processor and an interface circuit, wherein the interface circuit is configured to: receive a signal from a communication apparatus other than the communication apparatus and transmit the signal to the processor, or send a signal from the processor to a communication apparatus other than the communication apparatus; and the processor is configured to implement the method according to any one of claims 1 to 12 or the method according to any one of claims 13 to 20 through a logic circuit or by executing code instructions.

23. A computer-readable storage medium, wherein the storage medium stores a computer program or instructions, and when the computer program or the instructions are executed by a communication apparatus, the method according to any one of claims 1 to 12 or the method according to any one of claims 13 to 20 is implemented.

24. A computer program product, comprising computer program code, wherein when the computer program code runs on a computer, the method according to any one of claims 1 to 12 or the method according to any one of claims 13 to 20 is implemented.