

METHOD AND DEVICE FOR ANCHOR MASTER SELECTION

5 [0001] This application claims priority to Chinese Patent Application No. 201310634605.1, filed with the Chinese Patent Office on December 2, 2013 and Chinese Patent Application No. 201410301914.1, filed with the Chinese Patent Office on June 27, 2014, which are incorporated herein by reference in their entireties.

TECHNICAL FIELD

[0002] The present invention relates to the field of communications technologies, and in particular, to a method and device for anchor master selection.

BACKGROUND

10 [0003] With coming of a mobile Internet era, a mainstream pattern in the Internet industry becomes social, localized, and mobile. Particularly, with popularization of a mobile device equipped with a Wireless Fidelity (Wireless-Fidelity, Wi-Fi) interface, social application of a device in neighbor awareness networking (Neighbor Awareness
15 Networking, NAN) is becoming a hot spot in the industry.

[0004] A NAN network including multiple NAN devices is referred to as a NAN cluster (Cluster), and devices in a same NAN cluster have a same cluster identifier. Each device has its own attributes, including: a role (Role) and a state (State). A role includes two types: master (Master) and non-master (non-Master), and a state includes
20 two types: synchronization (sync) and non-synchronization (non-sync). A device in the sync state is responsible for maintaining cluster synchronization. A master must be in the sync state, but a non-master may be in a sync or non-sync state. Each device further includes a master rank (Master Rank, MR), a master with a largest MR in the NAN cluster becomes an anchor master (Anchor Master, AM), and all other devices
25 keep time synchronous with the AM, thereby ensuring synchronization of the entire NAN cluster.

[0005] A typical application scenario in the NAN cluster is that devices perform

Moreover, because the NAN cluster loses an AM, the entire NAN cluster crashes, and as a result, time synchronization between the devices cannot be implemented.

SUMMARY

[0008] Embodiments of the present invention provide a method and device for anchor master selection, which are used to maintain time synchronization between devices in a NAN cluster.

[0009] To resolve the foregoing technical problem, the following technical solutions are provided in the embodiments of the present invention:

[0010] According to a first aspect, an embodiment of the present invention provides a method for anchor master selection, including:

receiving, by a device, a neighbor awareness networking beacon NAN Beacon frame, where the NAN Beacon frame carries first AM information and first time synchronization function TSF information, and the first AM information includes: a first anchor master rank AMR, a first hop count HC, and a first anchor master beacon transmission time AMBTT; and the device records second AM information and second TSF information, where the second AM information comprises: a second AMR, a second HC, and a second AMBTT;

~~if the NAN Beacon frame is used for AM selection, when the first AMR is less than a the second AMR, and a master rank MR of the device is greater than the first AMR, switching, by the device, a role of the device to AM, where the device records second AM information, and the second AM information includes: the second AMR, a second HC, and a second AMBTT; and~~

if the NAN Beacon frame is used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is less than the first AMR, updating, by the device according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device.

[0011] With reference to the first aspect, in a first possible implementation manner of the first aspect, the method further includes:

if the NAN Beacon frame is used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is equal to the first AMR, switching, by the device, the role of the device to AM, or updating, by the device according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device.

[0012] With reference to the first aspect or the first possible implementation

[0017] With reference to the first aspect or the first, the second, the third, the fourth, the fifth, or the sixth possible implementation manner of the first aspect, in a seventh possible implementation manner of the first aspect, the method further includes:

5 if the NAN Beacon frame is used for AM selection, when the first AMR is greater than the second AMR, updating, by the device according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device.

[0018] With reference to the first aspect or the first, the second, the third, the fourth, the fifth, the sixth, or the seventh possible implementation manner of the first aspect, in an eighth possible implementation manner of the first aspect, the updating, by the device according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device includes:

updating, by the device, the second AMR value to the first AMR value;

15 updating, by the device, the second HC value to the first HC value plus 1;

if the NAN Beacon frame is sent by the AM, updating, by the device, the second AMBTT value to a value of a preset byte/preset bytes of the first TSF information; or if the NAN Beacon frame is not sent by the AM, updating, by the device, the second AMBTT value to the first AMBTT; and

20 updating, by the device, a value of the second TSF information to a value of the first TSF information.

[0019] With reference to the first aspect or the first, the second, the third, the fourth, the fifth, the sixth, the seventh, or the eighth possible implementation manner of the first aspect, in a ninth possible implementation manner of the first aspect, the method further includes:

25 if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, if the first AMBTT is greater than the second AMBTT, or the first AMBTT is equal to the second AMBTT and the first HC is less than the second HC minus 1, updating, by the device according to the NAN Beacon frame, the second TSF information and some information or all information of the second AM information that are recorded in the device.

[0020] With reference to the ninth possible implementation manner of the first aspect, in a tenth possible implementation manner of the first aspect,

if the NAN Beacon frame is used for AM selection, when the first AMR is

equal to the second AMR, and the first AMBTT is greater than the second AMBTT, the updating, by the device according to the NAN Beacon frame, the second TSF information and some information or all information of the second AM information that are recorded in the device includes:

5 updating, by the device, the second HC value to the first HC value plus 1;
 if the NAN Beacon frame is sent by the AM, updating, by the device, the
| second AMBTT value to the value of the preset byte/bytes of the first TSF
information; or if the NAN Beacon frame is not sent by the AM, updating, by the
device, the second AMBTT value to the first AMBTT; and

10 updating, by the device, the value of the second TSF information to the
value of the first TSF information; and

 if the NAN Beacon frame is used for AM selection, when the first AMR is
equal to the second AMR, and when the first AMBTT is equal to the second AMBTT,
and the first HC is less than the second HC minus 1, the updating, by the device
15 according to the NAN Beacon frame, the second TSF information and some
information or all information of the second AM information that are recorded in the
device includes:

 updating, by the device, the second HC value to the first HC value plus 1;
and

20 updating, by the device, the value of the second TSF information to the
value of the first TSF information.

[0021] With reference to the first aspect or the first, the second, the third, the
fourth, the fifth, the sixth, the seventh, or the eighth possible implementation manner
of the first aspect, in an eleventh possible implementation manner of the first aspect,
25 the method further includes at least one of the following steps:

 if the NAN Beacon frame is used for AM selection, when the first AMR is
equal to the second AMR, and the first HC is greater than or equal to the second HC,
ignoring, by the device, the first AM information carried in the NAN Beacon frame;

 if the NAN Beacon frame is used for AM selection, and the NAN Beacon
30 frame is not sent by the AM, when the first AMR is equal to the second AMR, the first
HC is equal to the second HC minus 1, and the first AMBTT is greater than the
second AMBTT, updating, by the device, the second AMBTT value to the first
AMBTT, and updating, by the device, the value of the second TSF information to the
value of the first TSF information;

if the NAN Beacon frame is used for AM selection, and the NAN Beacon frame is sent by the AM, when the first AMR is equal to the second AMR, the first HC is equal to the second HC minus 1, and the value of the preset byte/bytes of the first TSF information is greater than the second AMBTT, updating, by the device, the second AMBTT value to the first AMBTT, and updating, by the device, the value of the second TSF information to the value of the first TSF information; and

if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and the first HC is less than the second HC minus 1, if the NAN Beacon frame is sent by the AM, updating, by the device, the second AMBTT value to the value of the preset byte/bytes of the first TSF information; or if the NAN Beacon frame is not sent by the AM, updating, by the device, the second AMBTT value to the first AMBTT, updating, by the device, the value of the second TSF information to the value of the first TSF information, and updating, by the device, the second HC value to the first HC value plus 1.

[0022] With reference to the first aspect or the first, the second, the third, the fourth, the fifth, the sixth, the seventh, the eighth, the ninth, the tenth, or the eleventh possible implementation manner of the first aspect, in a twelfth possible implementation manner of the first aspect, the method further includes:

when a difference obtained by subtracting the second AMBTT from the value of the second TSF information is greater than a preset transmission time threshold, switching, by the device, the role of the device to AM.

[0023] With reference to the first aspect or the first, the second, the third, the fourth, the fifth, the sixth, the seventh, the eighth, the ninth, the tenth, the eleventh, or the twelfth possible implementation manner of the first aspect, in a thirteenth possible implementation manner of the first aspect, when the device is not an AM, and the MR of the device is updated, the method further includes:

when an updated MR of the device is greater than the second AMR, switching, by the device, the role of the device to AM.

[0024] With reference to the first aspect or the first, the second, the third, the fourth, the fifth, the sixth, the seventh, the eighth, the ninth, the tenth, the eleventh, the twelfth, or the thirteenth possible implementation manner of the first aspect, in a fourteenth possible implementation manner of the first aspect, the switching, by the device, the role of the device to AM includes:

updating, by the device, the second AMR value to the MR value of the

device;

updating, by the device, the second HC value to 0; and

updating, by the device, the second AMBTT value to a value of a preset byte/preset bytes of the second TSF information.

With reference to the first aspect or the first, the second, the third, the fourth, the fifth, the sixth, the seventh, the eighth, the ninth, the tenth, the eleventh, the twelfth, or the thirteenth possible implementation manner of the first aspect, in a fifteenth possible implementation manner of the first aspect, the switching, by the device, the role of the device to AM includes:

updating, by the device, the second AMR value to the MR value of the device;

updating, by the device, the second HC value to 0; and

updating, by the device, the second AMBTT value to 0x00000000.

[0025] With reference to the first aspect or the first, the second, the third, the fourth, the fifth, the sixth, the seventh, the eighth, the ninth, the tenth, the eleventh, the twelfth, the thirteenth, ~~or the fourteenth, or the fifteenth~~ possible implementation manner of the first aspect, in a ~~fifteenth-sixteenth~~ possible implementation manner of the first aspect, when the device is an AM, the method further includes:

when the MR of the device is updated, maintaining, by the device, an AM role, and updating, by the device, the recorded second AMR to an updated MR value of the device.

[0026] According to a second aspect, an embodiment of the present invention provides a device for anchor master selection, where the device includes:

a Beacon frame receiving module, configured to receive a neighbor awareness networking beacon NAN Beacon frame, where the NAN Beacon frame carries first AM information and first time synchronization function TSF information, and the first AM information includes: a first anchor master rank AMR, a first hop count HC, and a first anchor master beacon transmission time AMBTT; and the device records second AM information and second TSF information, where the second AM information comprises: a second AMR, a second HC, and a second AMBTT;

a role switching module, configured to: if the NAN Beacon frame is used for AM selection, when the first AMR is less than the second AMR, and a master rank MR of the device is greater than the first AMR, switch a role of the device to AM, ~~where the device records second AM information, and the second AM information includes: the second AMR, a second HC, and a second AMBTT; and~~

an information updating module, configured to: if the NAN Beacon frame is used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is less than the first AMR, update, according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device.

[0027] With reference to the second aspect, in a first possible implementation manner of the second aspect,

the role switching module is further configured to: if the NAN Beacon frame is used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is equal to the first AMR, switch the role of the device to AM; or

period, determining that NAN Beacon frame is not used for AM selection; and

if the NAN Beacon frame does not meet a fourth condition, determining that the NAN Beacon frame is used for AM selection, where the fourth condition is as follows: the first AMR is less than the second AMR within the preset time period, or the first AMR is equal to the third AMR within the preset time period.

[0033] With reference to the second aspect or the first, the second, the third, the fourth, the fifth, or the sixth possible implementation manner of the second aspect, in a seventh possible implementation manner of the second aspect, the information updating module is further configured to: if the NAN Beacon frame is used for AM selection, when the first AMR is greater than the second AMR, update, according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device.

[0034] With reference to the second aspect or the first, the second, the third, the fourth, the fifth, the sixth, or the seventh possible implementation manner of the second aspect, in an eighth possible implementation manner of the second aspect, the information updating module includes:

a first AMR updating submodule, configured to update the second AMR value to the first AMR value;

a first HC updating submodule, configured to update the second HC value to the first HC value plus 1;

a first AMBTT updating submodule, configured to: if the NAN Beacon frame is sent by the AM, update the second AMBTT value to a value of a preset byte/preset bytes of the first TSF information; or if the NAN Beacon frame is not sent by the AM, update the second AMBTT value to the first AMBTT; and

a TSF updating submodule, configured to update a value of the second TSF information to a value of the first TSF information.

[0035] With reference to the second aspect or the first, the second, the third, the fourth, the fifth, the sixth, the seventh, or the eighth possible implementation manner of the second aspect, in a ninth possible implementation manner of the second aspect, the information updating module is further configured to: if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, if the first AMBTT is greater than the second AMBTT, or the first AMBTT is equal to the second AMBTT and the first HC is less than the second HC minus 1, update, according to the NAN Beacon frame, the second TSF information and some

information or all information of the second AM information that are recorded in the device.

[0036] With reference to the ninth possible implementation manner of the second aspect, in a tenth possible implementation manner of the second aspect,

5 if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and the first AMBTT is greater than the second AMBTT, the information updating module includes:

the first HC updating submodule, configured to update the second HC value to the first HC value plus 1;

10 the first AMBTT updating submodule, configured to: if the NAN Beacon frame is sent by the AM, update the second AMBTT value to the value of the preset byte/bytes of the first TSF information; or if the NAN Beacon frame is not sent by the AM, update the second AMBTT value to the first AMBTT; and

15 the TSF updating submodule, configured to update the value of the second TSF information to the value of the first TSF information; and

if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and when the first AMBTT is equal to the second AMBTT, and the first HC is less than the second HC minus 1, the information updating module includes:

20 the first HC updating submodule, configured to update the second HC value to the first HC value plus 1; and

the TSF updating submodule, configured to update the value of the second TSF information to the value of the first TSF information.

[0037] With reference to the second aspect or the first, the second, the third, the fourth, the fifth, the sixth, the seventh, or the eighth possible implementation manner of the second aspect, in an eleventh possible implementation manner of the second aspect, the device further includes at least one of the following modules:

25 a Beacon frame ignoring module, configured to: if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and the first HC is greater than or equal to the second HC, ignore the first AM information carried in the NAN Beacon frame;

30 a first updating module, configured to: if the NAN Beacon frame is used for AM selection, and the NAN Beacon frame is not sent by the AM, when the first AMR is equal to the second AMR, the first HC is equal to the second HC minus 1,

and the first AMBTT is greater than the second AMBTT, update the second AMBTT value to the first AMBTT, and update the value of the second TSF information to the value of the first TSF information;

a second updating module, configured to: if the NAN Beacon frame is used for AM selection, and the NAN Beacon frame is sent by the AM, when the first AMR is equal to the second AMR, the first HC is equal to the second HC minus 1, and the value of the preset byte/bytes of the first TSF information is greater than the second AMBTT, update the second AMBTT value to the first AMBTT, and update the value of the second TSF information to the value of the first TSF information; and

a third updating module, configured to: if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and the first HC is less than the second HC minus 1, if the NAN Beacon frame is sent by the AM, update the second AMBTT value to the value of the preset byte/bytes of the first TSF information; or if the NAN Beacon frame is not sent by the AM, update the second AMBTT value to the first AMBTT, update the value of the second TSF information to the value of the first TSF information, and update the second HC value to the first HC value plus 1.

[0038] With reference to the second aspect or the first, the second, the third, the fourth, the fifth, the sixth, the seventh, the eighth, the ninth, the tenth, or the eleventh possible implementation manner of the second aspect, in a twelfth possible implementation manner of the second aspect, the role switching module is further configured to: when a difference obtained by subtracting the second AMBTT from the value of the second TSF information is greater than a preset transmission time threshold, switch the role of the device to AM.

[0039] With reference to the second aspect or the first, the second, the third, the fourth, the fifth, the sixth, the seventh, the eighth, the ninth, the tenth, the eleventh, or the twelfth possible implementation manner of the second aspect, in a thirteenth possible implementation manner of the second aspect, when the device is not an AM, and the MR of the device is updated, the role switching module is further configured to: when an updated MR of the device is greater than the second AMR, switch the role of the device to AM.

[0040] With reference to the second aspect or the first, the second, the third, the fourth, the fifth, the sixth, the seventh, the eighth, the ninth, the tenth, the eleventh, the twelfth, or the thirteenth possible implementation manner of the second aspect, in

a fourteenth possible implementation manner of the second aspect, the role switching module includes:

a second AMR updating submodule, configured to update the second AMR value to the MR value of the device;

5 a second HC updating submodule, configured to update the second HC value to 0; and

a second AMBTT updating submodule, configured to update the second AMBTT value to a value of a preset byte/preset bytes of the second TSF information.

10 With reference to the second aspect or the first, the second, the third, the fourth, the fifth, the sixth, the seventh, the eighth, the ninth, the tenth, the eleventh, the twelfth, or the thirteenth possible implementation manner of the second aspect, in a fifteenth possible implementation manner of the second aspect, the role switching module includes:

a second AMR updating submodule, configured to update the second AMR value to the MR value of the device;

15 a second HC updating submodule, configured to update the second HC value to 0; and

a second AMBTT updating submodule, configured to update the second AMBTT value to 0x00000000.

[0041] With reference to the second aspect or the first, the second, the third, the fourth, the fifth, the sixth, the seventh, the eighth, the ninth, the tenth, the eleventh, the twelfth, the thirteenth, ~~or the fourteenth, or the fifteenth~~ possible implementation manner of the second aspect, in a ~~fifteenth-sixteenth~~ possible implementation manner of the second aspect, when the device is an AM, the device further includes:

20 a role maintaining module, configured to: when the MR of the device is updated, maintain an AM role, and update the recorded second AMR to an updated MR value of the device.

[0042] It can be learned from the foregoing technical solutions that the embodiments of the present invention have the following advantages:

[0043] In the embodiments of the present invention, after a device receives a NAN Beacon frame, if the NAN Beacon frame is used for AM selection, when a first AMR included in the NAN Beacon frame is less than a second AMR recorded in the device, and an MR of the device is greater than the first AMR, the device switches a role of the device to AM; and if the NAN Beacon frame is used for AM selection, when the first AMR included in the NAN Beacon frame is less than the second AMR recorded in the device, and the MR of the device is less than the first AMR, the device updates, according to the NAN Beacon frame, second AM information and second TSF information that are recorded in the device. In a case in which the NAN Beacon frame received by the device can be used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is greater than the first AMR, the role of the device is switched to AM, and ~~the device switched to AM~~ the device whose role is switched to AM may overwrite an original AM in a NAN cluster, and therefore
30 an original AMR in the NAN cluster is also overwritten; even if an MR of the AM becomes smaller, a new AM is selected quickly. Therefore, there is always an AM in the NAN cluster, and each device can record correct AM information, so as to avoid a crash of the entire NAN cluster, and
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invention;

[0067] FIG. 7-e is a schematic structural diagram of composition of another device for anchor master selection according to an embodiment of the present invention;

5 [0068] FIG. 7-f is a schematic structural diagram of composition of another device for anchor master selection according to an embodiment of the present invention;

[0069] FIG. 7-g is a schematic structural diagram of composition of an information updating module according to an embodiment of the present invention;

10 [0070] FIG. 7-h is a schematic structural diagram of composition of another device for anchor master selection according to an embodiment of the present invention;

[0071] FIG. 7-i is a schematic structural diagram of composition of another device for anchor master selection according to an embodiment of the present invention;

15 [0072] FIG. 7-j is a schematic structural diagram of composition of a role switching module according to an embodiment of the present invention; and

[0073] FIG. 8 is a schematic structural diagram of composition of another device for anchor master selection according to an embodiment of the present invention.

DESCRIPTION OF EMBODIMENTS

20 [0074] Embodiments of the present invention provide a method and device for anchor master selection, which are used to maintain time synchronization between devices in a NAN cluster.

[0075] To make the invention objectives, features, and advantages of the present invention clearer and more comprehensible, the following clearly and completely describes the technical solutions in the embodiments of the present invention with
25 reference to the accompanying drawings in the embodiments of the present invention. Apparently, the embodiments described in the following are merely a part rather than all of the embodiments of the present invention. All other embodiments obtained by a person skilled in the art based on the embodiments of the present invention shall fall within the protection scope of the present invention.

30 [0076] Terms such as "first", "second" in the specification, claims, and foregoing accompanying drawings of the present invention are used to distinguish between similar objects, and are not necessarily used to describe a specific sequence or order.

access control (Medium Access Control, MAC) address. The random factor randomly changes once every 120 discovery windows (Discovery Window, DW). To prevent being traced, a local (Local) address is used as the MAC address of the NAN device, but—and each local MAC address remains unchanged for at least 30 minutes.

5 According to an existing device role and state switching rule, a device with a larger MR becomes a master. A master with a largest MR is referred to as an AM, all other devices keep time synchronous with the AM, thereby ensuring synchronization of the entire NAN cluster. Synchronization of the NAN cluster indicates that TSFs of all devices in the cluster maintain the same. For TSF synchronization, all the devices
10 need to be synchronized according to a clock of a same reference source, that is, the selected AM is used as the reference source, and a clock of another device maintains synchronization according to the clock of the AM. According to the foregoing description, because a reference of NAN synchronization is the AM, that is, the master with the largest MR, and the MR changes randomly with time, when an MR of
15 a device changes, the master with the largest MR in the cluster also changes. The NAN cluster is a loose distributed network, and therefore when the MR of the device changes, a correct AM can be immediately selected in the NAN cluster, which is crucial for maintaining synchronization of the NAN cluster.

[0083] It should be noted that, synchronization of the NAN cluster is implemented
20 by sending and receiving a NAN Beacon frame. In some embodiments of the present invention, the NAN Beacon frame received by the device may be specifically referred to as a synchronization beacon (Sync Beacon) frame. In some other embodiments, the NAN Beacon frame received by the device may be referred to as a discovery beacon (Discovery Beacon) frame. The master and a sync non-master separately send a Sync
25 Beacon frame once in each DW, and the master sends a Discovery Beacon frame once every 100 time units (Time Unit, TU) outside a DW. The latter enables another device that has not joined the NAN cluster to learn about time when a next DW starts, so as to join the cluster. Currently, a start location of a DW specified in the NAN cluster is fixed, for example, a DW starts when a TSF is an integer multiple of 512 TUs. The
30 Sync Beacon frame and the Discovery Beacon frame are frames with a similar frame structure, and have different names only because their sending locations are different. In addition to being used for synchronization, the device further performs role and state switching according to a received Sync Beacon frame. An example in which the NAN Beacon frame specifically is a Sync Beacon frame is described below.

[0084] In this embodiment of the present invention, because crystal oscillators inside different NAN devices have different frequencies, two devices must be often synchronized to ensure that no large deviation occurs between system clocks of the two devices. To maintain synchronization of the NAN cluster, each master and each sync non-master sends a Sync Beacon frame inside a DW, where the Sync Beacon frame includes AM information and a Time Stamp (eight bytes), and the Time Stamp is a TSF. To differentiate AM information carried in the NAN Beacon frame from AM information recorded in a device, which are two different pieces of AM information, in the following embodiments, the AM information carried in the NAN Beacon frame (which is also simply referred to as an AM carried in the frame) is referred to as "first AM information", and the AM information recorded in the device (which is also simply referred to as a recorded AM) is referred to as "second AM information". Likewise, an AMR, an HC, and an AMBTT that are included in the first AM information are respectively referred to as "a first AMR", "a first HC", and "a first AMBTT", and an AMR, an HC, and an AMBTT that are included in the second AM information are respectively referred to as "a second AMR", "a second HC", and "a second AMBTT". Likewise, in the following embodiments, TSF information carried in the NAN Beacon frame is referred to as "first TSF information", and TSF information recorded in the device is referred to as "second TSF information".

[0085] Specifically, the first AM information carried in the Sync Beacon frame may include the following contents:

a first AMR, that is, an MR value of an AM;

a first HC, that is, the quantity of hops from a current NAN device to the AM, where the HC of the AM is equal to 0, that is, it may be determined, according to whether the HC carried in the Sync Beacon frame is 0, whether the device is an AM. When the HC carried in the sent Sync Beacon frame is 0, the device that sends the Sync Beacon frame is the AM; or when the HC carried in the sent Sync Beacon frame is greater than 0, the device that sends the Sync Beacon frame is not the AM; and

a first AMBTT, that is, a value of a preset byte/preset bytes of the TSF when the AM sends the Sync Beacon frame, where if the device receives two Sync Beacon frames with different AMBTTs, a Sync Beacon frame with a larger AMBTT is considered as the latest Sync Beacon frame.

[0086] In this embodiment of the present invention, the AMBTT is specified as follows: The AMBTT of the AM is 0, that is, it may be determined, according to

third AMR. If the device is within the preset time period after updating of the second AMR starts, the device determines whether the first AMR is equal to the third AMR. If the device is in another time outside the preset time period, the device does not need to execute step A12, that is, when the device is in another time outside the preset time period, the device does not need to determine whether the first AMR is equal to the third AMR. In step A12, only when three conditions are met at the same time: the device is an AM, the first AMR is greater than or equal to the second AMR, and the first AMR is equal to the third AMR within the preset time period after updating of the second AMR starts, the device may determine that the received NAN Beacon frame is not used for AM selection. In addition, in this embodiment of the present invention, a value of the preset time period needs to be determined according to a specific application scenario. For example, the value of the preset time period may be several DWs; or may not be described by using a DW. For example, the value of the preset time period is N ms or N TU/TUs.

[0103] After the device determines a condition in which the received NAN Beacon frame is not used for AM selection, in any case except that the NAN Beacon frame is not used for AM selection, the device may determine that the NAN Beacon frame is used for AM selection. Therefore, in step A13, "the first condition" is defined in a case in which the device is an AM; when the NAN Beacon frame does not meet the first condition, the device may determine that the received NAN Beacon frame can be used for AM selection. Specifically, the first condition is: (a) or (b):

[0104] (a). The first AMR is less than the second AMR.

[0105] (b). The first AMR is equal to the third AMR within the preset time period after the second AMR recorded in the device is updated.

[0106] That the NAN Beacon frame does not meet the first condition may refer to that the NAN Beacon frame neither meets (a) nor meets (b). That (a) is not met refers to that the first AMR is greater than or equal to the second AMR. That (b) is not met includes two cases: the device is not within the preset time period; and the device is within the preset time period, but the first AMR is not equal to the third AMR. If neither (a) nor (b) is met, it is considered that ~~the device~~ the NAN Beacon frame does not meet the first condition. Therefore, when the device is an AM and the NAN Beacon frame does not meet the first condition, the device may determine that the NAN Beacon frame is not used for AM selection.

[0107] When the device is an AM, the device determines that the first AMR is

greater than or equal to the second AMR, and when the second AMR recorded in the device is updated, if the device is within the preset time period after updating of the second AMR starts, the device determines whether the first AMBTT is less than the second AMBTT; or if the device is in another time outside the preset time period, the device does not need to execute step A22, that is, when the device is in another time outside the preset time period, the device does not need to determine whether the first AMBTT is less than the second AMBTT. In step A22, only when three conditions are met at the same time: the device is an AM, the first AMR is greater than or equal to the second AMR, the first AMBTT is less than the second AMBTT within the preset time period after updating of the second AMR starts, the device may determine that the received NAN Beacon frame is not used for AM selection. In addition, in this embodiment of the present invention, a value of the preset time period needs to be determined according to a specific application scenario. For example, the value of the preset time period may be several DWs; or may not be described by using a DW. For example, the value of the preset time period is N ms or N TU/TUs.

[0108] After the device determines a condition in which the received NAN Beacon frame is not used for AM selection, in any case except that the NAN Beacon frame is not used for AM selection, the device may determine that the NAN Beacon frame is used for AM selection. Therefore, in step A23, "the second condition" is defined in a case in which the device is an AM; when the NAN Beacon frame does not meet the second condition, the device may determine that the received NAN Beacon frame can be used for AM selection. Specifically, the second condition is: (a) or (c):

[0109] (a). The first AMR is less than the second AMR.

[0110] (c). The first AMBTT is less than the second AMBTT within the preset time period after the second AMR recorded in the device is updated.

[0111] That the NAN Beacon frame does not meet the second condition may refer to that the NAN Beacon frame neither meets (a) nor meets (c). That (a) is not met refers to that the first AMR is greater than or equal to the second AMR. That (c) is not met includes two cases: the device is not within the preset time period; and the device is within the preset time period, but the first AMBTT is greater than or equal to the second AMBTT. If neither (a) nor (c) is met, it is considered that ~~the device the NAN Beacon frame~~ does not meet the second condition. Therefore, when the device is an AM and the NAN Beacon frame does not meet the second condition, the device may determine that the

does not meet the third condition, the device may determine that the received NAN Beacon frame can be used for AM selection. Specifically, the third condition is: (d) or (e):

[0124] (d). The first AMR is less than the second AMR within the preset time period.

[0125] (e). The first AMR is equal to the third AMR within the preset time period.

[0126] That the NAN Beacon frame does not meet the third condition may refer to that the NAN Beacon frame neither meets (d) nor meets (e). That (d) is not met includes two cases: the device is not within the preset time period; and the device is within the preset time period, but the first AMR is greater than or equal to the second AMR. That (e) is not met includes two cases: the device is not within the preset time period; and the device is within the preset time period, but the first AMR is not equal to the third AMR. If neither (d) nor (e) is met, it is considered that ~~the device~~ the NAN Beacon frame does not meet the third condition. Therefore, when the device is an AM and the NAN Beacon frame does not meet the third condition, the device may determine that the NAN Beacon frame is not used for AM selection.

[0127] When the device is not an AM, and when the second AMR recorded in the device is updated, the AMR before the second AMR in the device is updated is the third AMR. If the device is within the preset time period after updating of the second AMR starts, the device determines whether the first AMBTT is less than the second AMBTT; or if the device is in another time outside the preset time period, the device does not need to execute step B22, that is, when the device is in another time outside the preset time period, the device does not need to determine whether the first AMBTT is less than the second AMBTT. In step B22, only when two conditions are met at the same time: the device is not an AM, and the first AMBTT is less than the second AMBTT within the preset time period after updating of the second AMR starts, the device may determine that the received NAN Beacon frame is not used for AM selection. In addition, in this embodiment of the present invention, a value of the preset time period needs to be determined according to a specific application scenario. For example, the value of the preset time period may be several DWs; or may not be described by using a DW. For example, the value of the preset time period is N ms or N TU/TUs.

[0128] After the device determines a condition in which the received NAN Beacon frame is not used for AM selection, in any case except that the NAN Beacon

frame is not used for AM selection, the device may determine that the NAN Beacon frame is used for AM selection. Therefore, in step B23, "the fourth condition" is defined in a case in which the device is not an AM; when the NAN Beacon frame does not meet the fourth condition, the device may determine that the received NAN Beacon frame can be used for AM selection. Specifically, the fourth condition is: (d) or (f):

[0129] (d). The first AMR is less than the second AMR within the preset time period.

[0130] (f). The first AMBTT is less than the second AMBTT within the preset time period.

[0131] That the NAN Beacon frame does not meet the fourth condition may refer to that the NAN Beacon frame neither meets (d) nor meets (f). That (d) is not met includes two cases: the device is not within the preset time period; and the device is within the preset time period, but the first AMR is greater than or equal to the second AMR. That (f) is not met includes two cases: the device is not within the preset time period; and the device is within the preset time period, but the first AMBTT is greater than or equal to the second AMBTT. If neither (d) nor (f) is met, it is considered that ~~the device~~ the NAN Beacon frame does not meet the fourth condition. Therefore, when the device is an AM and the NAN Beacon frame does not meet the fourth condition, the device may determine that the NAN Beacon frame is not used for AM selection.

[0132] For example, if the device itself is not an AM, the first AMR value carried in the NAN Beacon frame received by the device is 7, the second AMR recorded in the device is 10, the AMR recorded in the device is 7 before being updated to 10, and the value of the preset time period is 5 DWs, the device separately performs determining according to conditions in the second condition: if the current device is within 3 DWs, the device is still within the preset time period, and $7 < 10$, that is, (d) is met, and the device determines that the NAN Beacon frame is not used for AM selection; and if the current device is in 3 DWs, which is less than the value 5 DWs of the preset time period, and the first AMR is equal to the third AMR, (e) is met, and the device determines that the NAN Beacon frame is not used for AM selection.

[0133] It should be noted that in this embodiment of the present invention, in a case in which the device determines that the NAN Beacon frame is not used for AM selection, the device may ignore the first AM information carried in the NAN Beacon

frame. In a case in which the device determines that the NAN Beacon frame is used for AM selection, the device still needs to determine the value relationship between the first AMR and the second AMR, and determine a value relationship between an MR of the device and the first AMR. There are three results for the determining, by the device, of the value relationship between the first AMR and the second AMR: (1) The first AMR is greater than the second AMR. (2) The first AMR is equal to the second AMR. (3) The first AMR is less than the second AMR. There are ~~two~~three results for the determining, by the device, of the value relationship between the MR and the first AMR: (1) The MR is greater than the first AMR. (2) The MR is less than the first AMR. (3) The MR is equal to the first AMR. Only in a case in which the NAN Beacon frame is used for AM selection, step 102 and step 103 are separately executed according to a determining result.

[0134] 102. If the NAN Beacon frame is used for AM selection, when a first AMR is less than a second AMR, and an MR of the device is greater than the first AMR, the device switches a role of the device to AM.

[0135] The device records second AM information, where the second AM information includes: the second AMR, a second HC, and the second AMBTT.

[0136] In this embodiment of the present invention, after the device receives the NAN Beacon frame, in a case in which the NAN Beacon frame is used for AM selection, when two conditions are met at the same time: the first AMR is less than the second AMR, and the MR of the device is greater than the first AMR, the device switches the role of the device to AM.

[0137] In some embodiments of the present invention, the device switches its own role in the NAN cluster to AM according to a role switching requirement in the NAN cluster when the two conditions are met at the same time: the first AMR is less than the second AMR, and the MR of the device is greater than the first AMR.

[0138] It should be noted that, in a case in which the NAN Beacon frame received by the device can be used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is greater than the first AMR, the role of the device is switched to AM, and ~~the device switched to AM~~the device whose role is switched to AM may overwrite an original AM in the NAN cluster; therefore, an original AMR in the NAN cluster is also overwritten, even if an MR of the AM becomes smaller, there is always a device whose MR is an AMR value. Therefore, there is always an AM in the NAN cluster, which avoids a crash of the entire NAN cluster, and ensures that time synchronization

between devices can be implemented.

[0139] Specifically, in step 102, that the device switches a role of the device to AM may specifically include the following steps:

[0140] C1. The device updates the second AMR value to the MR value of the device.

[0141] C2. The device updates the second HC value to 0.

[0142] C3. The device updates the second AMBTT value to a value of a preset byte/preset bytes of second TSF information.

[0143] Steps C1, C2, and C3 are for an update to the second AM information recorded in the device, so as to separately update the second AMR, the second HC, and the second AMBTT that are recorded in the device. For example, when a NAN device becomes an AM, the device sets AM information recorded in the device as follows: setting a second AMR of the device to its own MR; setting a second HC of the device to 0; and setting a second AMBTT of the device to 0x00000000. The value of the preset byte/bytes of the second TSF information may be a value of the last four bytes or a value of the last five bytes of the second TSF information, and the preset byte/bytes of the second TSF information may be set according to a specific application scenario.

[0144] 103. If the NAN Beacon frame is used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is less than the first AMR, the device updates, according to the NAN Beacon frame, second AM information and second TSF information that are recorded in the device.

[0145] In this embodiment of the present invention, after the device receives the NAN Beacon frame, in a case in which the NAN Beacon frame is used for AM selection, when two conditions are met at the same time: the first AMR is less than the second AMR, and the MR of the device is less than the first AMR, the device updates, according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device.

[0146] In some embodiments of the present invention, according to a requirement for updating AM information and TSF information in a NAN cluster, when the two conditions are met at the same time: the first AMR is less than the second AMR, and the MR of the device is less than the first AMR, the device updates, according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device.

[0147] It should be noted that, when the MR value of the device is insufficient to

make the device an AM, that is, when the first AMR is less than the second AMR recorded in the device, and the MR of the device is less than the first AMR, the device may update, according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device, and therefore the second AMR recorded in the device is also updated, and the original AMR in the NAN cluster is also overwritten; even if the MR of the AM becomes smaller, there is always the device whose MR is the AMR value. Therefore, there is always an AM in the NAN cluster, which avoids a crash of the entire NAN cluster and ensures that time synchronization between devices can be implemented.

10 [0148] Specifically, in step 103, that the device updates, according to the NAN Beacon frame, second AM information and second TSF information that are recorded in the device may specifically include the following steps:

[0149] D1. The device updates the second AMR value to the first AMR value.

[0150] D2. The device updates the second HC value to the first HC value plus 1.

15 [0151] D3. If the NAN Beacon frame is sent by an AM, the device updates the second AMBTT value to a value of a preset byte/preset bytes of first TSF information; or if the NAN Beacon frame is not sent by an AM, the device updates the second AMBTT value to the first AMBTT.

[0152] D4. The device updates a value of the second TSF information to a value of the first TSF information.

[0153] Steps D1, D2, D3, and D4 are for an update on the second AM information and the second TSF information that are recorded in the device, so as to separately update the second AMR, the second HC, the second AMBTT, and the second TSF information that are recorded in the device.

25 [0154] It should be noted that in some other embodiments of the present invention, the method for anchor master selection may further include the following step:

[0155] E1. If the NAN Beacon frame is used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is equal to the first AMR, the device switches the role of the device to AM; or

30 [0156] E2. If the NAN Beacon frame is used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is equal to the first AMR, the device updates, according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device.

[0157] Specifically, in step E1, that the device switches the role of the device to

AM may specifically include the following steps:

updating, by the device, the second AMR value to the MR value of the device;

updating, by the device, the second HC value to 0; and

5 updating, by the device, the second AMBTT value to the value of the preset byte/bytes of the second TSF information.

[0158] The foregoing description is for an update on all information of the second AM information recorded in the device, so as to separately update the second AMR, the second HC, and the second AMBTT that are recorded in the device. For example, 10 when a NAN device becomes an AM, the device sets AM information recorded in the device as follows: setting a second AMR of the device to its own MR; setting a second HC of the device to 0; and setting a second AMBTT of the device to 0x00000000. The value of the preset byte/bytes of the second TSF information may be a value of the last four bytes or a value of the last five bytes of the second TSF 15 information, and the preset byte/bytes of the second TSF information may be set according to a specific application scenario. For an implementation manner of performing role switching by the device, refer to description in the foregoing step 102, and details are not described herein again. A difference between step 102 and step E1 lies in an execution condition for switching the role of the device to AM by the 20 device.

[0159] Specifically, in step E2, that the device updates, according to the NAN Beacon frame, second AM information and second TSF information that are recorded in the device may specifically include the following steps:

updating, by the device, the second AMR value to the first AMR value;

25 updating, by the device, the second HC value to the first HC value plus 1;

if the NAN Beacon frame is sent by the AM, updating, by the device, the second AMBTT value to the value of the preset byte/bytes of the first TSF information; or if the NAN Beacon frame is not sent by the AM, updating, by the device, the second AMBTT value to the first AMBTT; and

30 updating, by the device, the value of the second TSF information to the value of the first TSF information.

[0160] The foregoing steps are for an update on the second AM information and the second TSF information that are recorded in the device, so as to separately update the second AMR, the second HC, the second AMBTT, and the second TSF 35 information that are recorded in the device. For how to update, by the device, on the second AM

information and the second TSF information that are recorded in the device, refer to description in the foregoing step 103, and details are not described herein again. A difference between step 103 and step E2 lies in an execution condition for updating, by the device, the second AM information and the second TSF information that are recorded in the device.

[0161] It can be learned, by using the foregoing description about this embodiment of the present invention, that after a device receives a NAN Beacon frame, if the NAN Beacon frame is used for AM selection, when a first AMR included in the NAN Beacon frame is less than a second AMR recorded in the device, and an MR of the device is greater than the first AMR, the device switches a role of the device to AM; or if the NAN Beacon frame is used for AM selection, when the first AMR included in the NAN Beacon frame is less than the second AMR recorded in the device, and an MR of the device is less than the first AMR, the device updates, according to the NAN Beacon frame, second AM information and second TSF information that are recorded in the device. In a case in which the NAN Beacon frame received by the device can be used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is greater than the first AMR, the role of the device is switched to AM, and ~~the device switched to AM~~the device whose role is switched to AM may overwrite an original AM in a NAN cluster, and therefore an original AMR in the NAN cluster is also overwritten; even if an MR of the AM becomes smaller, there is always a device whose MR is an AMR value. Therefore, there is always an AM in the NAN cluster, which avoids a crash of the entire NAN cluster, and ensures that time synchronization between devices can be implemented. When the MR value of the device is insufficient to make the device an AM, that is, when the first AMR is less than the second AMR recorded in the device, and the MR of the device is less than the first AMR, the device may update, according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device, and therefore the second AMR recorded in the device is also updated, and the original AMR in the NAN cluster is also overwritten; even if the MR of the AM becomes smaller, there is always the device whose MR is the AMR value. Therefore, there is always an AM in the NAN cluster, which avoids a crash of the entire NAN cluster and ensures that time synchronization between devices can be implemented.

[0162] Referring to FIG. 3, a method for anchor master selection provided in another embodiment of the present invention may specifically include the following

steps:

[0163] 301. A device receives a NAN Beacon frame.

[0164] The NAN Beacon frame carries first AM information and first TSF information, where the first AM information includes: a first AMR, a first HC, and a first AMBTT.

[0165] In this embodiment of the present invention, after the device receives the NAN Beacon frame, the device may acquire the first HC carried in the NAN Beacon frame from the NAN Beacon frame, and the device may determine a value relationship between the first HC and a preset hop count threshold. When the first HC is greater than the preset hop count threshold, step 302 is executed. When the first HC is less than or equal to the preset hop count threshold, the device may determine, according to the AM information carried in the NAN Beacon frame, whether the NAN Beacon frame can be used for AM selection. For a case in which the NAN Beacon frame can be used for AM selection, subsequent steps may continue to be executed, for example, execution of step 303 and step 304 is separately triggered.

[0166] It should be noted that in some other embodiments of the present invention, in addition to executing step 303 and step 304, the method for anchor master selection may further include the following steps:

if the NAN Beacon frame is used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is equal to the first AMR, the device switches the role of the device to AM; or

if the NAN Beacon frame is used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is equal to the first AMR, the device updates, according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device.

[0167] All information of the second AM information recorded in the device may be updated, and the second AMR, a second HC, and a second AMBTT that are recorded in the device are separately updated. For example, when a NAN device becomes an AM, the device sets AM information recorded in the device as follows: setting a second AMR of the device to its own MR; setting a second HC of the device to 0; and setting a second AMBTT of the device to 0x00000000. A value of a preset byte/preset bytes of the second TSF information may be a value of the last four bytes or a value of the last five bytes of the second TSF information, and the preset byte/bytes of the second

TSF information may be set according to a specific application scenario. For an update to the second AM information and the second TSF information that are recorded in the device, specifically, the second AMR, the second HC, the second AMBTT, and the second TSF information that are recorded in the device may be updated separately. For an update, by the device, on the second AM information and the second TSF information that are recorded in the device, reference is made to description in the foregoing step 103, and details are not described herein again.

[0168] It should be noted that, in this embodiment of the present invention, in a case in which the device determines that the NAN Beacon frame is not used for AM selection, the device may ignore the first AM information carried in the NAN Beacon frame. In a case in which the device determines that the NAN Beacon frame is used for AM selection, the device still needs to determine a value relationship between the first AMBTT and the second AMBTT. There are three results for the determining, by the device, of the value relationship between the first AMBTT and the second AMBTT: (1) The first AMBTT is greater than the second AMBTT. (2) The first AMBTT is equal to the second AMBTT. (3) The first AMBTT is less than the second AMBTT. The device further needs to determine a value relationship between the first HC and the second HC, and there are two results for the determining, by the device, of the value relationship between the first HC and the second HC: (1) The first HC is less than the second HC minus 1. (2) The first HC is greater than the second HC minus 1. Steps 305, 306, and 307 continue to be executed separately according to a difference of each determining result.

[0169] 302. If a first HC is greater than a preset hop count threshold, the device discards the NAN Beacon frame, and if the NAN Beacon frame is discarded, another step described subsequently does not need to be executed.

[0170] When the first HC is greater than the preset hop count threshold, the NAN Beacon frame received by the device is an invalid frame, and the device may discard the NAN Beacon frame.

[0171] 303. If the NAN Beacon frame is used for AM selection, when a first AMR is less than a second AMR, and an MR of the device is greater than the first AMR, the device switches a role of the device to AM.

[0172] 304. If the NAN Beacon frame is used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is less than the first AMR, the device updates, according to the NAN Beacon frame, second AM

information and second TSF information that are recorded in the device.

[0173] 305. If the NAN Beacon frame is used for AM selection, when the first AMR is greater than the second AMR, the device updates, according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device.

[0174] It should be noted that, a same action is executed by the device in step 304 and step 305, that is, the second AM information and the second TSF information that are recorded in the device are updated according to the NAN Beacon frame, but conditions for executing the action by the device are different in step 304 and step 305.

[0175] 306. If the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and a first AMBTT is greater than a second AMBTT, the device updates, according to the NAN Beacon frame, the second TSF information and some information or all information of the second AM information that are recorded in the device.

[0176] There are two cases in which the device needs to update, according to the NAN Beacon frame, the information recorded in the device: A first case is that the second TSF information and some information of the second AM information are updated; a second case is that the second TSF information and all information of the second AM information are updated.

[0177] Specifically, in step 306, that the device updates, according to the NAN Beacon frame, the second TSF information and some information or all information of the second AM information that are recorded in the device may specifically include the following steps:

updating, by the device, the second HC value to the first HC value plus 1;
if the NAN Beacon frame is sent by the AM, updating, by the device, the second AMBTT value to a value of a preset byte/preset bytes of first TSF information;
or if the NAN Beacon frame is not sent by the AM, updating, by the device, the second AMBTT value to the first AMBTT; and

updating, by the device, a value of the second TSF information to a value of the first TSF information.

[0178] In addition, in some other embodiments of the present invention, in step 306, that the device updates, according to the NAN Beacon frame, the second TSF information and some information or all information of the second AM information

that are recorded in the device may specifically include the following steps:

updating, by the device, the second AMR value to the first AMR value;

updating, by the device, the second HC value to the first HC value plus 1;

if the NAN Beacon frame is sent by the AM, updating, by the device, the

5 | second AMBTT value to the value of the preset byte/bytes of the first TSF information; or if the NAN Beacon frame is not sent by the AM, updating, by the device, the second AMBTT value to the first AMBTT; and

updating, by the device, the value of the second TSF information to the value of the first TSF information.

10 [0179] It should be noted that, a difference between the two implementation manners lies in whether the second AMR value recorded in the device needs to be updated. Specifically, one of the two implementation manners may be selected according to an application scenario.

15 [0180] 307. If the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and when the first AMBTT is equal to the second AMBTT, and the first HC is less than a second HC minus 1, the device updates, according to the NAN Beacon frame, the second TSF information and some information or all information of the second AM information that are recorded in the device.

20 [0181] There are two cases in which the device needs to update, according to the NAN Beacon frame, the information recorded in the device: A first case is that the second TSF information and some information of the second AM information are updated; a second case is that the second TSF information and all information of the second AM information are updated.

25 [0182] Specifically, in step 307, that the device updates, according to the NAN Beacon frame, the second TSF information and some information or all information of the second AM information that are recorded in the device may specifically include the following steps:

updating, by the device, the second HC value to the first HC value plus 1;

30 and

updating, by the device, the value of the second TSF information to the value of the first TSF information.

[0183] In addition, in some other embodiments of the present invention, in step 307, that the device updates, according to the NAN Beacon frame, the second TSF

information and some information or all information of the second AM information that are recorded in the device may specifically include the following steps:

updating, by the device, the second AMR value to the first AMR value;

updating, by the device, the second HC value to the first HC value plus 1;

5 if the NAN Beacon frame is sent by the AM, updating, by the device, the second AMBTT value to the value of the preset byte/bytes of the first TSF information; or if the NAN Beacon frame is not sent by the AM, updating, by the device, the second AMBTT value to the first AMBTT; and

10 updating, by the device, the value of the second TSF information to the value of the first TSF information.

[0184] It should be noted that, a difference between the two implementation manners lies in whether the second AMR value and the second AMBTT value that are recorded in the device need to be updated. Specifically, one of the two implementation manners may be selected according to an application scenario.

15 **[0185]** It should be noted that, in some embodiments of the present invention, one or more steps of step 302, and step 305 to step 307 may be specifically executed. For a specific execution situation, reference needs to be made to whether a condition required in each step is met, which is described only in an exemplary manner in this embodiment herein.

20 **[0186]** It can be learned, by using the foregoing description about this embodiment of the present invention, that after a device receives a NAN Beacon frame, if the NAN Beacon frame is used for AM selection, when a first AMR included in the NAN Beacon frame is less than a second AMR recorded in the device, and an MR of the device is greater than the first AMR, the device switches a role of the device to AM; or if the NAN Beacon frame is used for AM selection, when the first AMR included in the NAN Beacon frame is less than the second AMR recorded in the device, and an MR of the device is less than or equal to the first AMR, the device updates, according to the NAN Beacon frame, second AM information and second TSF information that are recorded in the device. In a case in which the NAN Beacon frame received by the device can be used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is greater than the first AMR, the role of the device is switched to AM, and ~~the device switched to AM~~ the device whose role is switched to AM may overwrite an original AM in a NAN cluster, and therefore an original AMR in the NAN cluster is also overwritten; even if an MR of the AM becomes smaller, a new AM is selected

35

(3) The first HC is less than the second HC minus 1. The device still needs to determine a value relationship between the first AMBTT and a second AMBTT, and there are three results for the determining, by the device, of the value relationship between the first AMBTT and the second AMBTT: (1) The first AMBTT is greater than the second AMBTT. (2) The first AMBTT is equal to the second AMBTT. (3) The first AMBTT is less than the second AMBTT. Steps 404, 405, and 406 are respectively executed subsequently according to a difference of each determining result.

[0192] In some other embodiments of the present invention, the device may further determine whether a difference obtained by subtracting the second AMBTT recorded in the device from a value of second TSF information is greater than a preset transmission time threshold, and determines, according to a determining result, whether to execute the following step:

[0193] When the difference obtained by subtracting the second AMBTT from the value of the second TSF information is greater than the preset transmission time threshold, switching, by the device, a role of the device to AM.

[0194] In addition, the switching, by the device, a role of the device to AM may specifically include the following steps:

updating, by the device, a second AMR value to an MR value of the device;

updating, by the device, the second HC value to 0; and

updating, by the device, the second AMBTT value to a value of a preset byte/preset bytes of the second TSF information.

[0195] When the MR of the device is updated, step 407 and step 408 may be respectively executed according to whether the device itself is an AM and a difference result of determining, by the device, whether an updated MR is greater than the recorded AMR.

[0196] 402. If the NAN Beacon frame is used for AM selection, when a first AMR is less than a second AMR, and an MR of the device is greater than the first AMR, the device switches a role of the device to AM.

[0197] 403. If the NAN Beacon frame is used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is less than the first AMR, the device updates, according to the NAN Beacon frame, second AM information and second TSF information that are recorded in the device.

[0198] 404. If the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and a first HC is greater than or equal to a second HC, the device ignores first AM information carried in the NAN Beacon frame.

[0199] 405. If the NAN Beacon frame is used for AM selection, and the NAN Beacon frame is not sent by the AM, when the first AMR is equal to the second AMR, the first HC is equal to the second HC minus 1, and a first AMBTT is greater than a second AMBTT, the device updates the second AMBTT value to the first AMBTT, and device updates a value of the second TSF information to a value of first TSF information.

[0200] In addition, in some other embodiments of the present invention, step 405 may further be replaced by the following step:

[0201] If the NAN Beacon frame is used for AM selection, and the NAN Beacon frame is sent by an AM, when the first AMR is equal to the second AMR, the first HC is equal to the second HC minus 1, and a value of a preset byte/preset bytes of the first TSF information is greater than the second AMBTT, the device updates the second AMBTT value to the first AMBTT, and device updates the value of the second TSF information to the value of the first TSF information.

[0202] 406. If the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and the first HC is less than the second HC minus 1, if the NAN Beacon frame is sent by an AM, the device updates the second AMBTT value to the value of the preset byte/bytes of the first TSF information; or if the NAN Beacon frame is not sent by an AM, the device updates the second AMBTT value to the first AMBTT, the device updates the value of the second TSF information to the value of the first TSF information, and the device updates the second HC value to the first HC value plus 1.

[0203] 407. When the device is not an AM, and the MR of the device is updated, when an updated MR of the device is greater than the second AMR, the device switches the role of the device to AM.

[0204] 408. When the device is an AM, and when the MR of the device is updated, the device maintains an AM role, and the device updates the recorded second AMR to an updated MR value of the device.

[0205] It should be noted that a same action is executed by the device in the foregoing steps 402 and 407, that is, the device switches the role of the device to AM, but conditions for executing the action by the device in the steps 402 and 407 are

different. In this case, that the device switches the role of the device to AM may specifically include the following steps:

updating, by the device, the second AMR value to the MR value of the device;

5 updating, by the device, the second HC value to 0; and

updating, by the device, the second AMBTT value to the value of the preset byte/bytes of the second TSF information.

[0206] It should be noted that in some embodiments of the present invention, one or more steps of step 404 to step 408 may be specifically executed. For a specific
10 execution situation, reference needs to be made to whether a condition required in each step is met, which is described only in an exemplary manner in this embodiment herein.

[0207] It can be learned, by using the foregoing description about this embodiment of the present invention, that after a device receives a NAN Beacon
15 frame, if the NAN Beacon frame is used for AM selection, when a first AMR included in the NAN Beacon frame is less than a second AMR recorded in the device, and an MR of the device is greater than the first AMR, the device switches a role of the device to AM; or if the NAN Beacon frame is used for AM selection, when the first AMR included in the NAN Beacon frame is less than the second AMR recorded in the device, and an MR of the device is less than or equal to the first AMR, the device
20 updates, according to the NAN Beacon frame, second AM information and second TSF information that are recorded in the device. In a case in which the NAN Beacon frame received by the device can be used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is greater than the first AMR, the role of the device is switched to AM, and ~~the device switched to AM~~the device whose
25 role is switched to AM may overwrite an original AM in a NAN cluster, and therefore an original AMR in the NAN cluster is also overwritten; even if an MR of the AM becomes smaller, a new AM is selected quickly. Therefore, there is always an AM in the NAN cluster, and each device can record correct AM information, which avoids a
30 crash of the entire NAN cluster, and ensures that time synchronization between devices can be implemented. When the MR value of the device is insufficient to make the device an AM, that is, when the first AMR is less than the second AMR recorded in the device, and the MR of the device is less than or equal to the first AMR, the device may update, according to the NAN Beacon frame, the second AM information
35 and the second TSF information that

Update myAMBTT: $\text{myAMBTT} = \text{rxAMBTT}$; and

Update myTSF: $\text{myTSF} = \text{rxTSF}$, that is, the device replaces a value of a TSF recorded in the device with a value of a Time Stamp field carried in the Sync Beacon frame.

5 **[0213]** If the recorded AMR value is equal to the AMR value in the Sync Beacon frame, the NAN device compares an HC recorded in the device with an HC in the Sync Beacon frame according to the following rules:

[0214] If the HC value in the Sync Beacon frame is greater than or equal to the recorded HC, the NAN device ignores the AM information in the Sync Beacon frame;

10 if the HC value in the Sync Beacon frame is equal to the recorded HC minus 1, and the AMBTT value in the Sync Beacon frame is greater than an AMBTT value in the recorded AM information, the NAN device uses the AMBTT value in the Sync Beacon frame as the AMBTT value recorded in the device; and

 if the HC value in the Sync Beacon frame is lower than the recorded HC
15 minus 1, the NAN device uses the HC plus 1 in the Sync Beacon frame as the HC value recorded in the device, and updates the AMBTT in an AM information record of the NAN device according to the following rules:

 if the received Sync Beacon frame is sent by an AM, the AMBTT in the current recorded AM information is set to a value of lower four bytes of a Time Stamp
20 field in the received Sync Beacon frame; and

 if the received Sync Beacon frame is from a NAN Master or a Sync Non-Master ~~Sync~~ device, the AMBTT in the current recorded AM information is set to a corresponding value of a NAN Cluster Attribute in the received Sync Beacon frame.

25 **[0215]** According to the common implementation manner described above, a case that occurs when an MR value of an AM becomes smaller is described by using an example in the following.

30 **[0216]** As shown in FIG. 5-a, FIG. 5-a is a schematic diagram of a process of updating AM information recorded in each device according to an embodiment of the present invention. As shown in FIG. 5-a, FIG. 5-a is a schematic diagram of a process of updating AM information recorded in each device according to an embodiment of the present invention.

[0217] It is assumed that initial MRs of four NAN devices A, B, C, and D are respectively 10, 6, 3, and 8, and therefore, A is an AM. Two neighboring nodes can mutually listen to and obtain a sent Sync Beacon frame, that is, A can receive a Sync

Beacon frame sent by B, B can receive a Sync Beacon frame sent by A or C, C can receive a Sync Beacon frame sent by B or D, and D can receive a Sync Beacon frame sent by C.

[0218] Each device in a NAN cluster maintains a variable `AM_timer`, which represents a validity period of a current AMBTT. Each time the AMBTT is updated, a value of `AM_timer` is reset to 16, which represents that the validity period is 16 DWs. `AM_timer` maintained in a device performs counting by subtraction, and when the `AM_timer` is decreased to 0, the device becomes an AM, where it is assumed that both MR updating and subtracting of `AM_timer` by 1 occur when a DW starts.

[0219] It is assumed that an MR of A is changed from 10 to 7 at a specific moment; in this case, a real AM in the NAN network is the device D. In this case, the device A still sets the device A itself to an `MR_AM`, changes an AMR to 7, and then sends a Sync Beacon frame. After receiving the Sync Beacon frame, because the AMR therein is 7, which is less than 10 recorded in B, B does not update an AMR.

Then, B sends a Sync Beacon frame, and after receiving the Sync Beacon frame, A finds that the AMR in the Sync Beacon frame is 10, which is greater than 7 recorded in A. Therefore, A updates its own state according to the Sync Beacon frame, that is, A sets the AMR recorded in A to 10, and sets an HC to 2. In this case, AMRs maintained in A and B are both 10, and HCs maintained in A and B are respectively 2 and 1; and C and D remain unchanged.

[0220] After 15 DWs, devices B, C, and D change themselves to AMs because `AM_timer` is changed to 0 (where maintained AMRs are changed to their own MRs respectively, and HCs are 0), and subsequently send Sync Beacon frames. A also sends a Sync Beacon frame. According to a received Sync Beacon frame, each device updates its own state according to the foregoing algorithm. In this case, AMRs recorded in A and B are 10, and HCs are respectively 2 and 3; and AMRs maintained in C and D are 8. In a following DW, C receives a Sync Beacon frame from B. Because an AMR (=10) of B is greater than an AMR (=8) of C, according to the foregoing algorithm, C updates a state according to the frame, where the recorded AMR is changed to 10, and an HC is changed to 4; and after one more DW, D receives a Sync Beacon frame from C. Likewise, D updates its own state according to the frame, where the recorded AMR is changed to 10, and an HC is changed to 5. So far, the AMRs maintained in the four devices are all 10, but HCs are respectively 4, 3, 4, and 5. Thereafter, the foregoing process is repeated. In this process, AMRs recorded

updating AM information recorded in each device according to an embodiment of the present invention. It is assumed that initial MRs of four NAN devices A, B, C, and D are respectively 10, 6, 8, and 9, and therefore, A is an AM. Two neighboring nodes can mutually listen to and obtain a sent Sync Beacon frame, that is, A can receive a Sync Beacon frame sent by B, B can receive a Sync Beacon frame sent by A or C, C can receive a Sync Beacon frame sent by B or D, and D can receive a Sync Beacon frame sent by C.

[0230] In FIG. 5-b, an initial condition of the four devices A, B, C, and D is similar to that in FIG. 5-a, that is, A is an AM. It is assumed that an MR of A is changed from 10 to 7 at a specific moment, and therefore an AMR of A is also changed to 7. If a Sync Beacon frame of A is sent earlier than that of B, when the frame is received by B, according to the algorithm provided in this embodiment of the present invention, an MR (=6) of B is less than an rxAMR (=7) of A, and therefore, B performs updating according to a state of A, where a new AMR is 7, and an HC is 1; and if a Sync Beacon frame of B is sent earlier than that of A, when A receives the frame, because an rxAMR (=10) is the same as an OldAMR (=10) of A, the frame is not used for AM selection. This avoids that an old AMR overwrites a new AMR.

[0231] Subsequently, the Sync Beacon frame sent by B is received by C, according to the algorithm provided in this embodiment of the present invention, C becomes an AM. C continues to send a Sync Beacon frame, which is received by B and D; according to the algorithm provided in this embodiment of the present invention, D becomes an AM, and B updates a state according to the Sync Beacon frame sent by C. Thereafter, D sends a Sync Beacon frame; because an AMR (=9) of D is largest, a state of D is received by C and is sent in a Sync Beacon frame in a next DW until updating of all nodes in the entire NAN network is completed.

[0232] In this embodiment of the present invention, in a preset time period after an AMR recorded in a device is changed (an AMR before the updating is recorded as OldAMR), if an rxAMR in the received Sync Beacon frame is equal to an OldAMR of the device, or when $rxAMR < myAMR$, the Sync Beacon frame is not used for AM selection. Therefore, two variables need to be maintained inside each device: the OldAMR and OldAMR_timer. The former records the AMR value before updating, and the latter is a timer. Each time the AMR recorded in the device is changed, the timer is reset to a preset value (for example, N DW/DWs), and then performs timing

diagram of statistics collection on the quantity of AMs in a NAN network in a method for AM selection according to an embodiment of the present invention. In FIG. 6-g and FIG. 6-h, a horizontal coordinate is a discovery window index (DW Index), and a vertical coordinate is the quantity of anchor masters (the number of Anchor Master).

In the original solution, no AM exists or two AMs exist in the network at most time; however, in the new solution, only one AM is maintained in the network in most cases. An AM is defined as a Master with a largest MR, and is a reference of synchronization of the NAN network. Generally, there is only one. Therefore, a result of the new solution better satisfies a design objective.

[0246] 2.3. HC of device

[0247] An HC of a device in a NAN network is separately shown in FIG. 6-i and FIG. 6-j when the original solution and the new solution are applied. As shown in FIG. 6-i, FIG. 6-i is a schematic diagram of statistics collection on an HC in a NAN network in a common method for AM selection. As shown in FIG. 6-j, FIG. 6-j is a schematic diagram of statistics collection on an HC in a NAN network in a method for AM selection according to an embodiment of the present invention. In FIG. 6-i and FIG. 6-j, a horizontal coordinate is a discovery window index (DW Index), and a vertical coordinate is a hop count (Hop Count). In the new solution, an HC in the network is always relatively small, and a largest HC does not exceed 8; however, in the original solution, when no larger MR appears, the HC of the device continuously increases, and a case in which HC=23 eventually occurs. Because a Sync Beacon frame in which an HC exceeds a specific threshold is discarded, even if a very small network scale is designed, an oversized HC results in a crash of the NAN network.

[0248] It should be noted that, in the original solution, an HC suddenly decreases after increasing to a specific value, and occurrence of this change is not caused by occurrence of a device with a larger MR in the NAN network. Next, that the HC does not become larger is analyzed in the following, and a reason why the HC does not become larger is that a backoff value (unit: timeslot) of sending a Sync Beacon frame is specified as follows:

$$backoff_timer = \begin{cases} U(0,15), HC = 0 \\ U(HC * 40, (HC + 1) * 40), HC > 0 \end{cases}$$

[0249] That is, the backoff time is related to the HC. A larger HC indicates a larger backoff value and later sending of a Sync Beacon frame. Another device further

the second AMR, and the MR of the device is greater than the first AMR, the role of the device is switched to AM, and ~~the device switched to AM~~the device whose role is switched to AM may overwrite an original AM in a NAN cluster, and therefore an original AMR in the NAN cluster is also overwritten; even if an MR of the AM becomes smaller, a new AM is selected quickly. Therefore, there is always an AM in the NAN cluster, and each device can record correct AM information, which avoids a crash of the entire NAN cluster, and ensures that time synchronization between devices can be implemented. When the MR value of the device is insufficient to make the device an AM, that is, when the first AMR is less than the second AMR recorded in the device, and the MR of the device is less than the first AMR, the device may update, according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device, and therefore the second AMR recorded in the device is also updated, and the original AMR in the NAN cluster is also overwritten; even if the MR of the AM becomes smaller, a new AM may be selected quickly. Therefore, there is always an AM in the NAN cluster, and each device can record the correct AM information, which avoids a crash of the entire NAN cluster and ensures that time synchronization between devices can be implemented.

[0253] It should be noted that, for brief description, the foregoing method embodiments are represented as a series of actions. However, a person skilled in the art should appreciate that the present invention is not limited to the described order of the actions, because according to the present invention, some steps may be executed in other orders or simultaneously. In addition, a person skilled in the art should also understand that all the embodiments described in this specification belong to exemplary embodiments, and the involved actions and modules may not be necessarily mandatory to the present invention.

[0254] To better implement the foregoing solutions in this embodiment of the present invention, a relevant apparatus configured to implement the foregoing solutions is provided in the following.

[0255] Referring to FIG. 7-a, a device 700 for anchor master selection provided in an embodiment of the present invention may include: a beacon frame receiving module 701, a role switching module 702, and an information updating module 703.

[0256] The beacon frame receiving module 701 is configured to receive a neighbor awareness networking beacon NAN Beacon frame, where the NAN Beacon frame carries first AM information and first time synchronization function TSF

present invention, the information updating module 703 includes:

a first AMR updating submodule 7031, configured to update the second AMR value to the first AMR value;

5 a first HC updating submodule 7032, configured to update the second HC value to the first HC value plus 1;

a first AMBTT updating submodule 7033, configured to: if the NAN Beacon frame is sent by the AM, update the second AMBTT value to a value of a preset byte/preset bytes of the first TSF information; or if the NAN Beacon frame is not sent by the AM, update the second AMBTT value to the first AMBTT; and

10 a TSF updating submodule 7034, configured to update a value of the second TSF information to a value of the first TSF information.

[0268] In some other embodiments of the present invention, the information updating module 703 is further configured to: if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and the first AMBTT is greater than the second AMBTT, update, according to the NAN Beacon frame, the second TSF information and some information or all information of the second AM information that are recorded in the device.

[0269] Specifically, the information updating module 703 may include:

20 a first HC updating submodule, configured to update the second HC value to the first HC value plus 1;

a first AMBTT updating submodule, configured to: if the NAN Beacon frame is sent by the AM, update the second AMBTT value to the value of the preset byte/bytes of the first TSF information; or if the NAN Beacon frame is not sent by the AM, update the second AMBTT value to the first AMBTT; and

25 a TSF updating submodule, configured to update the value of the second TSF information to the value of the first TSF information.

[0270] In some embodiments of the present invention, the information updating module 703 is further configured to: if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and when the first AMBTT is equal to the second AMBTT, and the first HC is less than the second HC minus 1, update, according to the NAN Beacon frame, the second TSF information and some information or all information of the second AM information that are recorded in the device.

[0271] Specifically, the information updating module 703 may include:

a first HC updating submodule, configured to update the second HC value to the first HC value plus 1; and

a TSF updating submodule, configured to update the value of the second TSF information to the value of the first TSF information.

5 [0272] Referring to FIG. 7-h, in some embodiments of the present invention, compared with the device 700 for anchor master selection shown in FIG. 7-a, the device 700 for anchor master selection may further include at least one of the following modules, and FIG. 7-h shows a Beacon frame ignoring module 710, a first updating module 711, and a third updating module 712 that are included in the device
10 700 for anchor master selection.

[0273] The Beacon frame ignoring module 710 is configured to: if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and the first HC is greater than or equal to the second HC, ignore the first AM information carried in the NAN Beacon frame.

15 [0274] The first updating module 711 is configured to: if the NAN Beacon frame is used for AM selection, and the NAN Beacon frame is not sent by the AM, when the first AMR is equal to the second AMR, the first HC is equal to the second HC minus 1, and the first AMBTT is greater than the second AMBTT, update the second AMBTT value to the first AMBTT, and update the value of the second TSF information to the
20 value of the first TSF information.

[0275] The third updating module 712 is configured to: if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and the first HC is less than the second HC minus 1, if the NAN Beacon frame is sent by the
| AM, update the second AMBTT value to the value of the preset byte/bytes of the first
25 TSF information; or if the NAN Beacon frame is not sent by the AM, update the second AMBTT value to the first AMBTT, update the value of the second TSF information to the value of the first TSF information, and update the second HC value to the first HC value plus 1.

[0276] Referring to FIG. 7-i, in some embodiments of the present invention, compared with the device 700 for anchor master selection shown in FIG. 7-a, the device 700 for anchor master selection may further include at least one of the following modules, and the FIG. 7-i shows the Beacon frame ignoring module 710, a second updating module 713, and the third updating module 712 that are included in
30 the device 700 for anchor master selection.

[0277] The Beacon frame ignoring module 710 is configured to: if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and the first HC is greater than or equal to the second HC, ignore the first AM information carried in the NAN Beacon frame.

5 | [0278] The ~~third~~-second updating module 713 is configured to: if the NAN Beacon frame is used for AM selection, and the NAN Beacon frame is sent by an AM, when the first AMR is equal to the second AMR, the first HC is equal to the second HC minus 1, and the value of the preset byte/bytes of the first TSF information is greater than the second AMBTT, update the second AMBTT value to the first AMBTT, and update the value of the second TSF information to the value of the first TSF information.

10 | [0279] The ~~second~~-third updating module 712 is configured to: if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and the first HC is less than the second HC minus 1, if the NAN Beacon frame is sent by the AM, update the second AMBTT value to the value of the preset byte/bytes of the first TSF information; or if the NAN Beacon frame is not sent by the AM, update the second AMBTT value to the first AMBTT, update the value of the second TSF information to the value of the first TSF information, and update the second HC value to the first HC value plus 1.

20 | [0280] In some embodiments of the present invention, the role switching module 702 is further configured to: when a difference obtained by subtracting the second AMBTT from the value of the second TSF information is greater than a preset transmission time threshold, switch the role of the device to AM.

25 | [0281] In some embodiments of the present invention, when the device is not an AM, and the MR of the device is updated, the role switching module 702 is further configured to: when an updated MR is greater than the second AMR, switch the role of the device to AM.

[0282] It should be noted that, referring to FIG. 7-j, in some embodiments of the present invention, the role switching module 702 includes:

30 | a second AMR updating submodule 7021, configured to update the second AMR value to the MR value of the device;

a second HC updating submodule 7022, configured to update the second HC value to 0; and

a second AMBTT updating submodule 7023, configured to update the second AMBTT value to a value of a preset byte/preset bytes of the second TSF information.

[0283] In some embodiments of the present invention, the device 700 for anchor master selection may further include: a role maintaining module, configured to: when the MR of the device is updated, maintain an AM role, and update the recorded second AMR to an updated MR value of the device.

5 [0284] It should be noted that content such as information exchange between the modules/units of the foregoing apparatus and the execution processes thereof is based on the same idea as that of the method embodiments of the present invention, and produces the same technical effects as that of the method embodiments of the present invention. For the specific content, refer to the descriptions in the method
10 embodiment described above, and details are not described herein again.

[0285] In conclusion, it can be learned, by using the foregoing description about this embodiment of the present invention, that after a beacon frame receiving module receives a NAN Beacon frame, if the NAN Beacon frame is used for AM selection, when a first AMR included in the NAN Beacon frame is less than a second AMR
15 recorded in a device, and an MR of the device is greater than the first AMR, a role switching module switches a role of the device to AM; or if the NAN Beacon frame is used for AM selection, when the first AMR included in the NAN Beacon frame is less than the second AMR recorded in the device, and an MR of the device is less than the first AMR, an information updating module updates, according to the NAN Beacon
20 frame, second AM information and second TSF information that are recorded in the device. In a case in which the NAN Beacon frame received by the device can be used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is greater than the first AMR, the role of the device is switched to AM, and
the device switched to AMthe device whose role is switched to AM may overwrite an
25 original AM in a NAN cluster, and therefore an original AMR in the NAN cluster is also overwritten; even if an MR of the AM becomes smaller, a new AM is selected quickly. Therefore, there is always an AM in the NAN cluster, and each device can record correct AM information, which avoids a crash of the entire NAN cluster, and ensures that time synchronization between devices can be implemented. When the
30 MR value of the device is insufficient to make the device an AM, that is, when the first AMR is less than the second AMR recorded in the device, and the MR of the device is less than the first AMR, the device may update, according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device, and therefore the second AMR recorded in the device is also
35 updated, and the original AMR in the NAN

cluster is also overwritten; even if the MR of the AM becomes smaller, a new AM may be selected quickly. Therefore, there is always an AM in the NAN cluster, and each device can record correct AM information, which avoids a crash of the entire NAN cluster and ensures that time synchronization between devices can be implemented.

[0286] This embodiment of the present invention further provides a computer storage medium, where the computer storage medium stores a program, and the program executes a part or all of steps recorded in the foregoing method embodiments.

[0287] Another device for anchor master selection provided in this embodiment of the present invention is introduced in the following. Referring to FIG. 8, a device 800 for anchor master selection includes: at least one receiver 801, at least one processor 802, at least one memory 803, and at least one communication bus 804, where the at least one communication bus 804 is used to implement connection and mutual communication between these components. (The quantity of the processors ~~803~~802 in the device 800 for anchor master selection may be one or more, and one processor is used as an example in FIG. 8). In some embodiments of the present invention, the at least one receiver 801, the at least one processor 802, and the memory 803 may be connected by using the communication bus or another means. An example in which connection is implemented by using the communication bus is used in FIG. 8.

[0288] The communication bus 804 may be an industry standard architecture (Industry Standard Architecture, ISA for short) bus, a peripheral component interconnect (Peripheral Component Interconnect, PCI for short) bus, or an extended industry standard architecture (Extended Industry Standard Architecture, EISA for short) bus, or the like. The bus 804 may be categorized into an address bus, a data bus, a control bus, and the like. For ease of denotation, the bus is represented by using only one thick line in FIG. 8; however, it does not indicate that there is only one bus or only one type of bus.

[0289] The memory 803 is configured to store executable program code, where the program code includes a computer operation instruction. The memory 803 may include a high-speed RAM memory, and may further include a non-volatile memory (non-volatile memory), for example, at least one magnetic disk memory.

[0290] The processor 802 may be a central processing unit (Central Processing Unit, CPU for short), an application-specific integrated circuit (Application Specific

Integrated Circuit, ASIC for short), or one or more integrated circuits configured to implement this embodiment of the present invention.

[0291] The processor 802 is configured to execute the executable program code stored in the memory 803, such as a computer program, so as to run a program corresponding to the executable code.

[0292] The receiver 801 is configured to receive a neighbor awareness networking beacon NAN Beacon frame, where the NAN Beacon frame carries first AM information and first time synchronization function TSF information, and the first AM information includes: a first anchor master rank AMR, a first hop count HC, and a first anchor master beacon transmission time AMBTT.

[0293] When executing the executable program code stored in the memory 803, the processor ~~803~~802 may specifically execute the following steps:

after the NAN Beacon frame is received, if the NAN Beacon frame is used for AM selection, when the first AMR is less than a second AMR, and a master rank MR of the device is greater than the first AMR, switching a role of the device to AM, where ~~the device records second AM information~~ are recorded in the device, and the second AM information includes: the second AMR, a second HC, and a second AMBTT; and

if the NAN Beacon frame is used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is less than the first AMR, updating, according to the NAN Beacon frame, the second AM information and second TSF information that are recorded in the device.

[0294] In some embodiments of the present invention, the processor ~~803~~802 is further configured to execute the following steps:

if the NAN Beacon frame is used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is equal to the first AMR, switching the role of the device to AM, or updating, by the device, according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device.

[0295] In some embodiments of the present invention, before the processor ~~803~~802 switches the role of the device to AM, or updates, by the device, according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device, the processor ~~803~~802 is further configured to execute the following steps:

if the first HC is less than or equal to the hop count threshold, triggering

execution of the step of switching the role of the device to AM, or triggering execution of the step of updating, according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device.

[0296] In some embodiments of the present invention, when the device is an AM, the processor 803-802 determines, in the following manners, whether the NAN Beacon frame is used for AM selection:

if the first AMR is less than the second AMR, determining that the NAN Beacon frame is not used for AM selection;

if the first AMR is greater than or equal to the second AMR, and if the first AMR is equal to a third AMR within a preset time period after updating of the second AMR starts, determining that the NAN Beacon frame is not used for AM selection, where the third AMR is an AMR before the second AMR in the device is updated; and

if the NAN Beacon frame does not meet a first condition, determining that the NAN Beacon frame is used for AM selection, where the first condition is as follows: the first AMR is less than the second AMR, or the first AMR is equal to the third AMR within the preset time period.

[0297] When the device is an AM, in some embodiments of the present invention, the processor 803-802 may determine, in the following manners, whether the NAN Beacon frame is used for AM selection:

if the first AMR is less than the second AMR, determining that the NAN Beacon frame is not used for AM selection;

if the first AMR is greater than or equal to the second AMR, and if the first AMBTT is less than the second AMBTT within a preset time period after updating of the second AMR starts, determining that the NAN Beacon frame is not used for AM selection; and

if the NAN Beacon frame does not meet a second condition, determining that the NAN Beacon frame is used for AM selection, where the second condition is as follows: the first AMR is less than the second AMR, or the first AMBTT is less than the second AMBTT within the preset time period.

[0298] When the device is not an AM, in some embodiments of the present invention, the processor 803-802 may determine, in the following manners, whether the NAN Beacon frame is used for AM selection:

if the first AMR is less than the second AMR within a preset time period after updating of the second AMR starts, determining that the NAN Beacon frame is

not used for AM selection;

if the first AMR is equal to a third AMR within the preset period time, determining that the NAN Beacon frame is not used for AM selection, where the third AMR is an AMR before the second AMR in the device is updated; and

5 if the NAN Beacon frame does not meet a third condition, determining that the NAN Beacon frame is used for AM selection, where the third condition is as follows: the first AMR is less than the second AMR within the preset time period, or the first AMR is equal to the third AMR within the preset time period.

[0299] When the device is not an AM, in some embodiments of the present
10 invention, the processor ~~803~~-802 may determine, in the following manners, whether the NAN Beacon frame is used for AM selection:

if the first AMR is less than the second AMR within a preset time period after updating of the second AMR starts, determining that the NAN Beacon frame is not used for AM selection;

15 if the first AMBTT is less than the second AMBTT within the preset time period, determining that NAN Beacon frame is not used for AM selection; and

if the NAN Beacon frame does not meet a fourth condition, determining that the NAN Beacon frame is used for AM selection, where the fourth condition is as follows: the first AMR is less than the second AMR within the preset time period, or
20 the first AMBTT is less than the second AMBTT within the preset time period.

[0300] In some embodiments of the present invention, the processor ~~803~~-802 is further configured to execute the following steps: if the NAN Beacon frame is used for AM selection, when the first AMR is greater than the second AMR, updating, according to the NAN Beacon frame, the second AM information and the second TSF
25 information that are recorded in the device.

[0301] In some embodiments of the present invention, the updating, by the processor ~~803~~-802 according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device specifically includes:

updating the second AMR value to the first AMR value;

30 updating the second HC value to the first HC value plus 1;

if the NAN Beacon frame is sent by the AM, updating the second AMBTT value to a value of a preset byte/preset bytes of the first TSF information; or if the NAN Beacon frame is not sent by the AM, updating the second AMBTT value to the first AMBTT; and

updating a value of the second TSF information to a value of the first TSF information.

[0302] In some embodiments of the present invention, the processor 803-802 is further configured to execute the following steps:

5 if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, if the first AMBTT is greater than the second AMBTT, or the first AMBTT is equal to the second AMBTT and the first HC is less than the second HC minus 1, updating, according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device.

10 [0303] In some embodiments of the present invention, the processor 803-802 is further configured to execute at least one of the following steps:

if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and the first HC is greater than or equal to the second HC, ignoring the first AM information carried in the NAN Beacon frame;

15 if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, the first AMBTT value is not 0, the first HC is equal to the second HC minus 1, and the first AMBTT is greater than the second AMBTT, updating the second AMBTT value to the first AMBTT, and updating the value of the second TSF information to the value of the first TSF information;

20 if the NAN Beacon frame is used for AM selection, and the first AMBTT value is 0, when the first AMR is equal to the second AMR, the first HC is equal to the second HC minus 1, and the value of the preset byte/bytes of the first TSF information is greater than the second AMBTT, updating the second AMBTT value to the first AMBTT, and updating the value of the second TSF information to the value
25 of the first TSF information; and

if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and the first HC is less than the second HC minus 1, if the NAN Beacon frame is sent by the AM, updating the second AMBTT value to the value of the preset byte/bytes of the first TSF information; or if the NAN Beacon
30 frame is not sent by the AM, updating the second AMBTT value to the first AMBTT, updating the value of the second TSF information to the value of the first TSF information, and updating the second HC value to the first HC value plus 1.

[0304] In some embodiments of the present invention, the processor 803-802 is further configured to execute ~~at least one of the following steps:~~

when a difference obtained by subtracting the second AMBTT from the value of the second TSF information is greater than a preset transmission time threshold, switching the role of the device to AM.

[0305] In some embodiments of the present invention, when the device is not an AM, and the MR of the device is updated, the processor 803-802 is further configured to execute the following steps:

when an updated MR of the device is greater than the second AMR, switching the role of the device to AM.

[0306] In some embodiments of the present invention, the switching, by the processor 803-802, the role of the device to AM specifically includes:

updating the second AMR value to the first AMR value;

updating the second HC value to 0; and

updating the second AMBTT value to the value of the preset byte/bytes of the second TSF information.

[0307] In some embodiments of the present invention, when the device is not an AM, the processor 803-802 is further configured to execute the following steps:

when the MR of the device is updated, maintaining an AM role, and updating the recorded second AMR to an updated MR value of the device.

[0308] It can be learned, by using the foregoing description about this embodiment of the present invention, that after a device receives a NAN Beacon frame, if the NAN Beacon frame is used for AM selection, when a first AMR included in the NAN Beacon frame is less than a second AMR recorded in the device, and an MR of the device is greater than the first AMR, the device switches a role of the device to AM; or if the NAN Beacon frame is used for AM selection, when the first AMR included in the NAN Beacon frame is less than the second AMR recorded in the device, and an MR of the device is less than the first AMR, the device updates, according to the NAN Beacon frame, second AM information and second TSF information that are recorded in the device. In a case in which the NAN Beacon frame received by the device can be used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is greater than the first AMR, the role of the device is switched to AM, and the device switched to AM the device whose role is switched to AM may overwrite an original AM in a NAN cluster, and therefore an original AMR in the NAN cluster is also overwritten; even if an MR of the AM becomes smaller, a new AM is selected quickly. Therefore, there is always an AM in the NAN cluster, and each device can

CLAIMS

What is claimed is:

1. A method for anchor master, AM, selection, where the method comprises:
receiving (101, 301, 401), by a device, a neighbor awareness networking beacon,
5 NAN Beacon, frame, wherein the NAN Beacon frame carries first AM information
and first time synchronization function, TSF, information, and the first AM
information comprises: a first anchor master rank, AMR, a first hop count, HC, and a
first anchor master beacon transmission time, AMBTT; and the device records second
10 AM information and second TSF information are recorded in the device, wherein the
second AM information comprises: a second AMR, a second HC, and a second
AMBTT;

if the NAN Beacon frame is used for AM selection, when the first AMR is less
than the second AMR, and a master rank, MR, of the device is greater than the first
AMR, switching (102, 303, 402), by the device, a role of the device to AM; and

15 if the NAN Beacon frame is used for AM selection, when the first AMR is less
than the second AMR, and the MR of the device is less than the first AMR, updating
(103, 304, 403), by the device according to the NAN Beacon frame, the second AM
information and the second TSF information that are recorded in the device.

2. The method according to claim 1, wherein the method further comprises:
20 if the NAN Beacon frame is used for AM selection, when the first AMR is less
than the second AMR, and the MR of the device is equal to the first AMR, switching,
by the device, the role of the device to AM, or updating, by the device according to
the NAN Beacon frame, the second AM information and the second TSF information
that are recorded in the device.

25 3. The method according to claim 1 or 2, before the switching, by the device, the
role of the device to AM, and the updating, by the device according to the NAN
Beacon frame, the second AM information and the second TSF information that are
recorded in the device, the method further comprises:

30 if the first HC is less than or equal to the hop count threshold, triggering, by the
device, execution of the step of switching, by the device, the role of the device to AM,
or triggering, by the device, execution of the step of updating, by the device,
according to the NAN Beacon frame, the second AM information and the second TSF

information that are recorded in the device.

4. The method according to any one of claims 1 to 3, wherein when the device is an AM, whether the NAN Beacon frame is used for AM selection is determined in the following manners:

5 if the first AMR is less than the second AMR, determining, by the device, that the NAN Beacon frame is not used for AM selection;

10 if the first AMR is greater than or equal to the second AMR, and if the first AMR is equal to a third AMR within a preset time period after updating of the second AMR starts, determining, by the device, that the NAN Beacon frame is not used for AM selection, wherein the third AMR is an AMR before the second AMR in the device is updated; and

15 if the NAN Beacon frame does not meet a first condition, determining, by the device, that the NAN Beacon frame is used for AM selection, wherein the first condition is as follows: the first AMR is less than the second AMR, or the first AMR is equal to the third AMR within the preset time period.

5. The method according to any one of claims 1 to 3, wherein when the device is an AM, whether the NAN Beacon frame is used for AM selection is determined in the following manners:

20 if the first AMR is less than the second AMR, determining, by the device, that the NAN Beacon frame is not used for AM selection;

if the first AMR is greater than or equal to the second AMR, and if the first AMBTT is less than the second AMBTT within a preset time period after updating of the second AMR starts, determining, by the device, that the NAN Beacon frame is not used for AM selection; and

25 if the NAN Beacon frame does not meet a second condition, determining, by the device, that the NAN Beacon frame is used for AM selection, wherein the second condition is as follows: the first AMR is less than the second AMR, or the first AMBTT is less than the second AMBTT within the preset time period.

30 6. The method according to any one of claims 1 to 3, wherein when the device is not an AM, whether the NAN Beacon frame is used for AM selection is determined in the following manners:

if the first AMR is less than the second AMR within a preset time period after updating of the second AMR starts, determining, by the device, that the NAN Beacon frame is not used for AM selection;

if the first AMR is equal to a third AMR within the preset period time, determining, by the device, that the NAN Beacon frame is not used for AM selection, wherein the third AMR is an AMR before the second AMR in the device is updated; and

5 if the NAN Beacon frame does not meet a third condition, determining, by the device, that the NAN Beacon frame is used for AM selection, wherein the third condition is as follows: the first AMR is less than the second AMR within the preset time period, or the first AMR is equal to the third AMR within the preset time period.

7. The method according to any one of claims 1 to 3, wherein when the device is not an AM, whether the NAN Beacon frame is used for AM selection is determined in the following manners:

if the first AMR is less than the second AMR within a preset time period after updating of the second AMR starts, determining, by the device, that the NAN Beacon frame is not used for AM selection;

15 if the first AMBTT is less than the second AMBTT within the preset time period, determining, by the device, that the NAN Beacon frame is not used for AM selection; and

if the NAN Beacon frame does not meet a fourth condition, determining, by the device, that the NAN Beacon frame is used for AM selection, wherein the fourth condition is as follows: the first AMR is less than the second AMR within the preset time period, or the first AMBTT is less than the second AMBTT within the preset time period.

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

25 if the NAN Beacon frame is used for AM selection, when the first AMR is greater than the second AMR, updating, by the device according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device.

92. The method according to any one of claims 1 to 8, wherein the updating, by the device according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device comprises:

updating, by the device, the second AMR value to the first AMR value;

updating, by the device, the second HC value to the first HC value plus 1;

if the NAN Beacon frame is sent by the AM, updating, by the device, the second

AMBTT value to a value of a preset byte/preset bytes of the first TSF information; or if the NAN Beacon frame is not sent by the AM, updating, by the device, the second AMBTT value to the first AMBTT; and

updating, by the device, a value of the second TSF information to a value of the first TSF information.

103. The method according to ~~any one of claims 1 to 9~~ or 2, wherein the method further comprises:

if the NAN Beacon frame is used for AM selection, when and the first AMR is equal to the second AMR,

if the first AMBTT is greater than the second AMBTT, or the first AMBTT is equal to the second AMBTT and the first HC is less than the second HC minus 1, updating (306, 307), by the device according to the NAN Beacon frame, the second TSF information and some information or all information of the second AM information that are recorded in the device.

11. The method according to claim 10, wherein

~~if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and the first AMBTT is greater than the second AMBTT, the updating, by the device according to the NAN Beacon frame, the second TSF information and some information or all information of the second AM information that are recorded in the device comprises:~~

~~updating, by the device, the second HC value to the first HC value plus 1;~~

~~if the NAN Beacon frame is sent by the AM, updating, by the device, the second AMBTT value to the value of the preset byte of the first TSF information; or if the NAN Beacon frame is not sent by the AM, updating, by the device, the second AMBTT value to the first AMBTT; and~~

~~updating, by the device, the value of the second TSF information to the value of the first TSF information; and~~

~~if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and when the first AMBTT is equal to the second AMBTT, and the first HC is less than the second HC minus 1, the updating, by the device according to the NAN Beacon frame, the second TSF information and some information or all information of the second AM information that are recorded in the device comprises:~~

~~updating, by the device, the second HC value to the first HC value plus 1; and~~

~~updating, by the device, the value of the second TSF information to the value of~~

the first TSF information.

12. The method according to any one of claims 1 to 9, wherein the method further comprises at least one of the following steps:

if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and the first HC is greater than or equal to the second HC, ignoring, by the device, the first AM information carried in the NAN Beacon frame;

if the NAN Beacon frame is used for AM selection, and the NAN Beacon frame is not sent by the AM, when the first AMR is equal to the second AMR, the first HC is equal to the second HC minus 1, and the first AMBTT is greater than the second AMBTT, updating, by the device, the second AMBTT value to the first AMBTT, and updating, by the device, the value of the second TSF information to the value of the first TSF information;

if the NAN Beacon frame is used for AM selection, and the NAN Beacon frame is sent by the AM, when the first AMR is equal to the second AMR, the first HC is equal to the second HC minus 1, and the value of the preset byte of the first TSF information is greater than the second AMBTT, updating, by the device, the second AMBTT value to the first AMBTT, and updating, by the device, the value of the second TSF information to the value of the first TSF information; and

if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and the first HC is less than the second HC minus 1, if the NAN Beacon frame is sent by the AM, updating, by the device, the second AMBTT value to the value of the preset byte of the first TSF information; or if the NAN Beacon frame is not sent by the AM, updating, by the device, the second AMBTT value to the first AMBTT, updating, by the device, the value of the second TSF information to the value of the first TSF information, and updating, by the device, the second HC value to the first HC value plus 1.

13. The method according to any one of claims 1 to 12, wherein the method further comprises:

when a difference obtained by subtracting the second AMBTT from the value of the second TSF information is greater than a preset transmission time threshold, switching, by the device, the role of the device to AM.

14. The method according to any one of claims 1 to 13, wherein when the device is not an AM, and the MR of the device is updated, the method further comprises:

when an updated MR of the device is greater than the second AMR, switching,

by the device, the role of the device to AM.

15. The method according to any one of claims 1 to 14, wherein the switching, by the device, the role of the device to AM comprises:

updating, by the device, the second AMR value to the MR value of the device;

updating, by the device, the second HC value to 0; and

updating, by the device, the second AMBTT value to a value of a preset byte of the second TSF information.

164. The method according to any one of claims 1 to 143, wherein the switching, by the device, the role of the device to AM comprises:

updating, by the device, the second AMR value to the MR value of the device;

updating, by the device, the second HC value to 0; and

updating, by the device, the second AMBTT value to 0x00000000.

175. The method according to any one of claims 1 to 164, wherein when the device is an AM, the method further comprises:

when the MR of the device is updated, maintaining (408), by the device, an AM role, and updating, by the device, the recorded second AMR to an updated MR value of the device.

186. A device for anchor master AM selection, where the device comprises:

a Beacon frame receiving module, configured to receive a neighbor awareness networking beacon NAN Beacon frame, wherein the NAN Beacon frame carries first AM information and first time synchronization function TSF information, and the first AM information comprises: a first anchor master rank AMR, a first hop count HC, and a first anchor master beacon transmission time AMBTT; and the device records second AM information and second TSF information are recorded in the device, wherein the second AM information comprises: a second AMR, a second HC, and a second AMBTT;

a role switching module, configured to: if the NAN Beacon frame is used for AM selection, when the first AMR is less than the second AMR, and a master rank MR of the device is greater than the first AMR, switch a role of the device to AM; and

an information updating module, configured to: if the NAN Beacon frame is used for AM selection, when the first AMR is less than the second AMR, and the MR of the device is less than the first AMR, update, according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device.

19. The device according to claim 18, wherein
the role-switching module is further configured to: if the NAN Beacon frame is
used for AM selection, when the first AMR is less than the second AMR, and the MR
of the device is equal to the first AMR, switch the role of the device to AM; or

5 the information updating module is further configured to: if the NAN Beacon
frame is used for AM selection, when the first AMR is less than the second AMR, and
the MR of the device is equal to the first AMR, update, according to the NAN Beacon
frame, the second AM information and the second TSF information that are recorded
in the device.

10 20. The device according to claim 18 or 19, wherein the device further
comprises:

an execution triggering module, configured to: if the first HC is less than or
equal to the hop count threshold, trigger the role-switching module to execute the step
of switching the role of the device to AM, or trigger the information updating module
15 to execute the step of updating, according to the NAN Beacon frame, the second AM
information and the second TSF information that are recorded in the device.

21. The device according to any one of claims 18 to 20, wherein when the device
is an AM, the device further comprises: a first AM selection determining module,
configured to determine, in the following manners, whether the NAN Beacon frame is
20 used for AM selection:

if the first AMR is less than the second AMR, determining that the NAN Beacon
frame is not used for AM selection;

if the first AMR is greater than or equal to the second AMR, and if the first AMR
is equal to a third AMR within a preset time period after updating of the second AMR
25 starts, determining that the NAN Beacon frame is not used for AM selection, wherein
the third AMR is an AMR before the second AMR in the device is updated; and

if the NAN Beacon frame does not meet a first condition, determining that the
NAN Beacon frame is used for AM selection, wherein the first condition is as follows:
the first AMR is less than the second AMR, or the first AMR is equal to the third
30 AMR within the preset time period.

22. The device according to any one of claims 18 to 20, wherein when the device
is an AM, the device further comprises: a second AM selection determining module,
configured to determine, in the following manners, whether the NAN Beacon frame is
used for AM selection:

if the first AMR is less than the second AMR, determining that the NAN Beacon frame is not used for AM selection;

if the first AMR is greater than or equal to the second AMR, when the second AMR in the device is updated, if the first AMBTT is less than the second AMBTT within a preset time period after updating of the second AMR starts, determining that the NAN Beacon frame is not used for AM selection; and

if the NAN Beacon frame does not meet a second condition, determining that the NAN Beacon frame is used for AM selection, wherein the first condition is as follows: the second AMR is less than the second AMR, or the first AMBTT is less than the second AMBTT within the preset time period.

23. The device according to any one of claims 18 to 20, wherein when the device is not an AM, the device further comprises: a third AM selection determining module, configured to determine, in the following manners, whether the NAN Beacon frame is used for AM selection:

if the first AMR is less than the second AMR within a preset time period after updating of the second AMR starts, determining that the NAN Beacon frame is not used for AM selection;

if the first AMR is equal to a third AMR within the preset period time, determining that the NAN Beacon frame is not used for AM selection, wherein the third AMR is an AMR before the second AMR in the device is updated; and

if the NAN Beacon frame does not meet a third condition, determining that the NAN Beacon frame is used for AM selection, wherein the third condition is as follows: the first AMR is less than the second AMR within the preset time period, or the first AMR is equal to the third AMR within the preset time period.

24. The device according to any one of claims 18 to 20, wherein when the device is not an AM, the device further comprises: a fourth AM selection determining module, configured to determine, in the following manners, whether the NAN Beacon frame is used for AM selection:

if the first AMR is less than the second AMR within a preset time period after updating of the second AMR starts, determining that the NAN Beacon frame is not used for AM selection;

if the first AMBTT is less than the second AMBTT within the preset time period, determining that NAN Beacon frame is not used for AM selection; and

if the NAN Beacon frame does not meet a fourth condition, determining that the

~~NAN Beacon frame is used for AM selection, wherein the fourth condition is as follows: the first AMR is less than the second AMR within the preset time period, or the first AMR is equal to the third AMR within the preset time period.~~

5 ~~25. The device according to any one of claims 18 to 24, wherein the information updating module is further configured to: if the NAN Beacon frame is used for AM selection, when the first AMR is greater than the second AMR, update, according to the NAN Beacon frame, the second AM information and the second TSF information that are recorded in the device.~~

10 ~~26. The device according to any one of claims 18 to 25_6, wherein the information updating module comprises:~~

~~a first AMR updating submodule, configured to update the second AMR value to the first AMR value;~~

~~a first HC updating submodule, configured to update the second HC value to the first HC value plus 1;~~

15 ~~a first AMBTT updating submodule, configured to: if the NAN Beacon frame is sent by the AM, update the second AMBTT value to a value of a preset byte/preset bytes of the first TSF information; or if the NAN Beacon frame is not sent by the AM, update the second AMBTT value to the first AMBTT; and~~

20 ~~a TSF updating submodule, configured to update a value of the second TSF information to a value of the first TSF information.~~

27. ~~The device according to any one of claim_s 18 to 266 or 7, wherein the information updating module is further configured to: if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR,~~

25 ~~if the first AMBTT is greater than the second AMBTT, or the first AMBTT is equal to the second AMBTT and the first HC is less than the second HC minus 1, update, according to the NAN Beacon frame, the second TSF information and some information or all information of the second AM information that are recorded in the device.~~

28. ~~The device according to claim 27, wherein~~

30 ~~if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and the first AMBTT is greater than the second AMBTT, the information updating module comprises:~~

~~the first HC updating submodule, configured to update the second HC value to the first HC value plus 1;~~

~~the first AMBTT updating submodule, configured to: if the NAN Beacon frame is sent by the AM, update the second AMBTT value to the value of the preset byte of the first TSF information; or if the NAN Beacon frame is not sent by the AM, update the second AMBTT value to the first AMBTT; and~~

5 ~~the TSF updating submodule, configured to update the value of the second TSF information to the value of the first TSF information; and~~

~~if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and when the first AMBTT is equal to the second AMBTT, and the first HC is less than the second HC minus 1, the information updating module comprises:~~

10 ~~the first HC updating submodule, configured to update the second HC value to the first HC value plus 1; and~~

~~the TSF updating submodule, configured to update the value of the second TSF information to the value of the first TSF information.~~

15 ~~29. The device according to any one of claims 18 to 28, wherein the device further comprises at least one of the following modules:~~

~~a Beacon frame ignoring module, configured to: if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and the first HC is greater than or equal to the second HC, ignore the first AM information carried in the NAN Beacon frame;~~

20 ~~a first updating module, configured to: if the NAN Beacon frame is used for AM selection, and the NAN Beacon frame is not sent by the AM, when the first AMR is equal to the second AMR, the first HC is equal to the second HC minus 1, and the first AMBTT is greater than the second AMBTT, update the second AMBTT value to the first AMBTT, and update the value of the second TSF information to the value of the first TSF information;~~

25 ~~a second updating module, configured to: if the NAN Beacon frame is used for AM selection, and the NAN Beacon frame is sent by the AM, when the first AMR is equal to the second AMR, the first HC is equal to the second HC minus 1, and the value of the preset byte of the first TSF information is greater than the second AMBTT, update the second AMBTT value to the first AMBTT, and update the value of the second TSF information to the value of the first TSF information; and~~

30 ~~a third updating module, configured to: if the NAN Beacon frame is used for AM selection, when the first AMR is equal to the second AMR, and the first HC is less~~

than the second HC minus 1, if the NAN Beacon frame is sent by the AM, update the second AMBTT value to the value of the preset byte of the first TSF information; or if the NAN Beacon frame is not sent by the AM, update the second AMBTT value to the first AMBTT, update the value of the second TSF information to the value of the first TSF information, and update the second HC value to the first HC value plus 1.

30. The device according to any one of claims 18 to 29, wherein the role switching module is further configured to: when a difference obtained by subtracting the second AMBTT from the value of the second TSF information is greater than a preset transmission time threshold, switch the role of the device to AM.

31. The device according to any one of claims 18 to 30, wherein when the device is not an AM, and the MR of the device is updated, the role switching module is further configured to: when an updated MR of the device is greater than the second AMR, switch the role of the device to AM.

32. The device according to any one of claims 18 to 31, wherein the role switching module comprises:

a second AMR updating submodule, configured to update the second AMR value to the MR value of the device;

a second HC updating submodule, configured to update the second HC value to 0;
and

a second AMBTT updating submodule, configured to update the second AMBTT value to a value of a preset byte of the second TSF information.

33. The device according to any one of claims 18 to 32, wherein the role switching module comprises:

a second AMR updating submodule, configured to update the second AMR value to the MR value of the device;

a second HC updating submodule, configured to update the second HC value to 0;
and

a second AMBTT updating submodule, configured to update the second AMBTT value to 0x00000000.

34. The device according to any one of claims 18 to 33, wherein when the device is an AM, the device further comprises:

a role maintaining module, configured to: when the MR of the device is updated, maintain an AM role, and update the recorded second AMR to an updated MR value of the device.

6. A device (800) for anchor master, AM, selection, where the device comprises:
a memory (803) storing instructions;

a receiver (801) configured to receive a neighbor awareness networking beacon,
NAN Beacon, frame, where the NAN Beacon frame carries first AM information and
first time synchronization function, TSF, information, and the first AM information
includes: a first anchor master rank, AMR, a first hop count, HC, and a first anchor
master beacon transmission time, AMBTT; and second AM information and second
TSF information are recorded in the device, wherein the second AM information
comprises: a second AMR, a second HC, and a second AMBTT;

a processor (802) configured to execute the instructions to perform operations of:
after the NAN Beacon frame is received, if the NAN Beacon frame is used for
AM selection, when the first AMR is less than the second AMR, and a master rank,
MR, of the device is greater than the first AMR, switching a role of the device to AM;
and

if the NAN Beacon frame is used for AM selection, when the first AMR is less
than the second AMR, and the MR of the device is less than the first AMR, updating,
according to the NAN Beacon frame, the second AM information and the second TSF
information that are recorded in the device.

7. The device according to claim 6, wherein the operation of updating comprises:
updating the second AMR value to the first AMR value;
updating the second HC value to the first HC value plus 1;
if the NAN Beacon frame is sent by the AM, updating the second AMBTT value
to a value of a preset byte/preset bytes of the first TSF information; or if the NAN
Beacon frame is not sent by the AM, updating the second AMBTT value to the first
AMBTT; and

updating a value of the second TSF information to a value of the first TSF
information.

8. The device according to claim 6 or 7, wherein the processor (802) is further
configured to execute the instructions to perform operations of:

if the NAN Beacon frame is used for AM selection and the first AMR is equal to
the second AMR,

if the first AMBTT is greater than the second AMBTT, or the first AMBTT is
equal to the second AMBTT and the first HC is less than the second HC minus 1,
updating, according to the NAN Beacon frame, the second TSF information and some

information or all information of the second AM information that are recorded in the device.

9. The device according to any one of claims 6-8, wherein the operation of switching comprises:

updating the second AMR value to the MR value of the device;

updating the second HC value to 0; and

updating the second AMBTT value to 0x00000000.

10. The device according to any one of claims 6-9, wherein when the device is an AM, the processor (802) is further configured to execute the instructions to perform operations of:

when the MR of the device is updated, maintaining an AM role, and updating the recorded second AMR to an updated MR value of the device.

11. A computer program product, comprising computer program code, which, when executed by a computer unit, will cause the computer unit to perform the method of any one of claims 1 to 5.