

specific integrated circuit (Application-Specific Integrated Circuit, ASIC), or one or more integrated circuits configured to implement this embodiment of this application, for example, one or more microprocessors (digital processor signal, DSP), or one or more field programmable gate arrays (Field Programmable Gate Array, FPGA).

5 **[0062]** The processor 401 may execute various functions of the communications apparatus 400~~communications device~~ by running or executing a software program stored in the memory 402 and invoking data stored in the memory 402.

[0063] During specific implementation, in an embodiment, the processor 401 may include one or more CPUs, for example, a CPU 0 and a CPU 1 shown in FIG. 4.

10 **[0064]** During specific implementation, in an embodiment, the communications apparatus 400 may include a plurality of processors, for example, the processor 401 and a processor 405 shown in FIG. 4. Each of the processors may be a single-core-CPU (single-CPU) processor or may be a multi-core-CPU (multi-CPU) processor. The processor herein may be one or more communication devices, circuits, and/or processing cores configured to process data (for example, computer
15 program instructions).

[0065] The memory 402 may be a read-only memory (read-only memory, ROM) or another type of static storage communications device that can store static information and instructions; or a random access memory (random access memory, RAM) or another type of dynamic storage communications device that can store information and instructions. The memory 402 may
20 alternatively be an electrically erasable programmable read-only memory (Electrically Erasable Programmable Read-Only Memory, EEPROM), a compact disc read-only memory (Compact Disc Read-Only Memory, CD-ROM) or another compact disc storage, optical disc storage (including a compact disc, a laser disc, an optical disc, a digital versatile disc, a Blu-ray disc, or the like), a magnetic disk storage medium or another magnetic storage communications device, or any other
25 medium that can be used to carry or store expected program code in a form of instructions or a data structure and that is accessible by a computer, but is not limited thereto. The memory 402 may exist independently, and is connected to the processor 401 through the communications bus 404. The memory 402 may alternatively be integrated with the processor 401. The memory 402 is configured to store a software program for executing the solutions of this application, and the
30 processor 401 controls execution of the software program.

[0066] The transceiver 403 is configured to communicate with another device (for example,

changed, and each beacon frame or the another management frame includes one TIM element. One bit in a partial virtual bitmap in the TIM element correspondingly indicates whether one STA has a downlink traffic. For example, for each BSS, the first AP allocates an AID to each second STA in a STA multi-link device in the BSS, that is, the AID corresponds to a second STA operating on a link in the station multi-link device. For another example, the first AP allocates AIDs to some second STAs in the STA multi-link device, and links on which the STAs operate are links in a candidate link set managed by the first AP. Optionally, there are a plurality of methods for allocating an AID by the AP to the STA. For example, for a method for allocating an AID by the AP to the STA, refer to descriptions in steps S1301 to 1305.

[00104] For example, for each BSS, the first AP allocates one AID to a STA operating on a primary link in the STA multi-link device in the BSS. The first AP allocates one or two AIDs to a STA operating on each secondary link in the STA multi-link device in the BSS.

[00105] For example, in the second implementation, when a first bit in a bitmap control field in the TIM element indicates whether the second STA operating on the primary link has a downlink multicast traffic, a corresponding bit in the partial virtual bitmap field~~partial-virtual-bit-field~~ in the TIM element may be used to indicate whether the second STA operating on the primary link in the STA multi-link device has a corresponding downlink unicast traffic. The first AP allocates one AID to the second STA operating on the primary link, and whether a bit that is corresponding to the AID of the second STA operating on the primary link and that is in the partial virtual bitmap field in the TIM element is set to 1 is used to indicate whether the second STA has a downlink unicast traffic. In an implementation in which the first AP allocates one AID to the second STA operating on the secondary link in the STA multi-link device, whether a bit that is corresponding to the AID of the second STA and that is in the partial virtual bitmap field in the TIM element is set to 1 is used to indicate whether the second STA has a downlink unicast traffic or a downlink multicast traffic. In other words, the one AID allocated by the first AP to the second STA operating on the secondary link corresponds to both the downlink unicast traffic and the downlink multicast traffic. In an implementation in which the first AP allocates two AIDs to the second STA operating on the secondary link in the STA multi-link device, one AID is used to indicate whether the second STA corresponding to the AID has a downlink unicast traffic, and the other AID is used to indicate whether the second STA corresponding to the AID has a downlink multicast traffic. For example, the first AP may allocate two AIDs to the second STA operating on the secondary link, and whether

identifier information field is used to identify a specific link.

[00116] For example, if a key BSS parameter is updated in the BSS in which the link indicated by the link identifier information field is located, or a key parameter is updated for the link indicated by the link identifier information field, a value of the beacon check field is incremented by 1. For example, when determining that a key BSS parameter is updated in a BSS of a link, the first AP increases a value of a beacon check field in a traffic by 1, where link identifier information in the traffic indicates the link. The BSS parameter may also be understood as a link parameter.

[00117] For example, each time the STA multi-link device maintain a record of ~~memorizes~~ a value of a beacon check field corresponding to each link received last time. If a value of a beacon check field corresponding to a link in a recently received traffic is different from a value of a beacon check field corresponding to the link received last time, the STA multi-link device receives, on the link, a beacon frame sent from the AP multi-link device.

[00118] For example, the key BSS parameter may include one or more of the following information: inclusion of a channel switch announcement element (Inclusion of a Channel Switch Announcement element), inclusion of an extended channel switch announcement element (Inclusion of an Extended Channel Switch Announcement element), modification of the EDCA parameters element (Modification of the EDCA parameters element), inclusion of a quiet element (Inclusion of a Quiet element), modification of the DSSS parameter set (Modification of the DSSS Parameter set), modification of the CF parameter set element (Modification of the CF Parameter Set element), modification of the HT operation element (Modification of the HT Operation element), inclusion of a wide bandwidth channel switch element (inclusion of a wide bandwidth channel switch element), inclusion of a channel switch wrapper element (Inclusion of a Channel Switch Wrapper element), inclusion of an operating mode notification element (Inclusion of an Operating Mode Notification element), inclusion of a quiet channel element (Inclusion of a Quiet Channel element), modification of the VHT (very high throughput) operation element (Modification of the VHT Operation element), modification of the HE (high efficient) operation element (Modification of the HE Operation element), insertion of a broadcast TWT element (Insertion of a Broadcast TWT element), inclusion of the BSS color change announcement element (Inclusion of the BSS Color Change Announcement element), modification of the MU EDCA parameter set element (Modification of the MU EDCA Parameter Set element), or modification of the spatial reuse parameter set element (Modification of the Spatial Reuse Parameter Set element).

information field, when the multi-link TIM frame is used, though the STA multi-link device includes a plurality of second STAs in one BSS, only one AID is required. In addition, based on the identifier information and the AID of the link, a station that operates on the link indicated by the link identifier information field and has a downlink traffic can be determined.

5 **[00123]** For example, the link identifier information field may be a special field used to indicate links in the station multi-link device that are used to receive a downlink traffic. In an implementation, the special field includes a special link identifier. A special MAC address (or a BSSID) or a combination of an operating class and a channel number, or a combination thereof, is used to indicate that all links of the station multi-link device (the first STA) are used to receive a
10 downlink traffic. In another implementation, the special field may alternatively be a multi-link identifier bitmap field or one or more link identifier information fields. The multi-link identifier bitmap field or the one or more link identifier information fields is/are used to indicate one or more links for receiving a downlink traffic of the station multi-link device. For example, when a value of a bit that is corresponding to an AID of the station multi-link device and that is in the partial
15 virtual bitmap field in a TIM element is 1, it is determined that the station multi-link device has a downlink traffic. Then, the downlink traffic sent by the AP may be received on one or more links indicated by the multi-link identifier bitmap field or the multi-link identifier information~~information~~ field. One bit in the multi-link identifier bitmap field may correspond to one link, and when a value of one or more bits is 1, it indicates that one or more links corresponding
20 to the one or more bits are used to receive the downlink traffic. Optionally, a PS-Poll may be sent by a station operating on the primary link in the station multi-link device, or the PS-Poll may be sent by each of a plurality of stations operating on the secondary link in the station multi-link device.

[00124] Optionally, the multi-link TIM frame may not include the link identifier information
25 field. When the multi-link TIM frame does not include the link identifier information field, the multi-link TIM frame may be used to indicate whether the station multi-link device (the first STA) has a downlink traffic.

[00125] For example, the multi-link TIM frame shown in FIG. 7 includes a field indicating identifier information of a link, and the field indicating the identifier information of a link is used
30 to identify a specific link. For example, with reference to FIG. 6, the first STA is the STA multi-link device 2, and a primary link determined by the STA multi-link device 2 is the link 2. In this

case, the first AP may send the multi-link TIM frame to the STA multi-link device 2 over the link 2. If a link indicated by the link identifier information in the multi-link TIM frame is the link 3, and a value of a bit that is corresponding to an AID of the STA multi-link device 2 and that is in the partial virtual bitmap field in the TIM element is 1, it indicates that downlink traffic data of the STA 2-2 operating on the link 3 in the STA multi-link device 2 is buffered in the first AP.

[00126] In another implementation, a frame structure of the multi-link TIM frame is shown in FIG. 8. An action field of the multi-link TIM frame is located in a frame carrier, and the frame carrier further includes a link quantity field in addition to a type field and an unprotected WNM action field. When the link quantity field indicates a plurality of links, each link further includes a beacon check field, a TIM element field, and a link identifier information field. Optionally, the frame carrier may further include one or more timestamp fields. The multi-link TIM frame shown in FIG. 8 is used to indicate whether a plurality of stations operating on links indicated by link identifier information fields have a downlink traffic.

[00127] It should be noted that the beacon check field and the link identifier information field included in the TIM frame or the multi-link TIM frame may alternatively be placed in another management frame, and the plurality of fields may be independently used to notify whether the BSS parameter of the link indicated by the link identifier information field is changed. For whether BSS parameters of a plurality of links are changed, the foregoing method may also be used. For example, the frame carrier includes a link quantity field, n beacon check fields, and n link identifier information fields, where n is indicated by the link quantity field. For another example, the frame carrier includes a link identifier bitmap and n beacon check fields, and optionally includes a length field of the link identifier bitmap, where n is a quantity of bits whose values are first values (for example, 1) in the link identifier bitmap. Values of one or more beacon check fields are initialized to 0.

[00128] For example, the multi-link TIM frame shown in FIG. 8 includes a field indicating a quantity of links and the link identifier information field, where the link identifier information field is used to identify a specific link. Different from the multi-link TIM frame shown in FIG. 7 that only indicates whether a plurality of stations operating on links have a downlink traffic, the multi-link TIM frame shown in FIG. 8 indicates whether a plurality of stations operating on a plurality of links have a downlink traffic. For example, with reference to FIG. 6, the first STA is the STA multi-link device 2, and the primary link determined by the STA multi-link device 2 is the link 2. In this

case, the first AP may send the multi-link TIM frame to the STA multi-link device 2 (or the STA2-1 operating on the link 2) over the link 2. If a quantity of links indicated by the link quantity field in the multi-link TIM frame is 2, links indicated by the link identifier information field are the link 2 and the link 3, and the value of the bit that is corresponding to an AID of the STA multi-link device 2 and that is in the partial virtual bitmap field in the TIM element is 1, the TIM element in the multi-link TIM frame indicates that downlink traffic data of both the STA 2-1 operating on the link 2 and the STA 2-2 operating on the link 3 in the STA multi-link device 2 is buffered in the first AP. It should be noted that, though the STA multi-link device 2 herein includes a plurality of second STAs in one BSS, only one AID is required. In addition, based on the AID and the identifier information of the link, a station that operates on the link indicated by the link identifier information field and has a downlink traffic can be determined.

[00129] It should be noted that in this embodiment of this application, the first AP allocates one or two AIDs to the STA operating on each link in the STA multi-link device, without changing a frame format of an existing beacon frame or a management frame. This helps determine a link on which a second STA, in the STA multi-link device, that has a downlink traffic operates. Alternatively, an existing frame format may be changed to the multi-link TIM frame, where the multi-link TIM frame includes the field indicating the identifier information of a link, and may optionally include a field indicating a quantity of links. This helps determine a station that operates on the link indicated by the link identifier information field and has a downlink traffic.

[00130] A power-saving mode or a non-power-saving mode of the station multi-link device (for example, the first STA) may be separately set by each second STA, or may be set by the second STA operating on the primary link. Specifically, the power-saving mode or the non-power-saving mode may be set by a power management bit in a frame control field in a MAC header in a MAC frame. When the station multi-link device (for example, the first STA) is in the power-saving mode, the second STA operating on the primary link in the station multi-link device (for example, the first STA) periodically receives a beacon frame, and the second STA operating on the secondary link may not need to periodically receive the beacon frame.

[00131] S504: The second STA operating on the primary link receives the downlink traffic indication information from the first AP.

[00132] For example, the second STA operating on the primary link may receive the beacon frame, another management frame, or the TIM frame sent by the first AP. The second STA operating on the primary link may determine, based on the downlink traffic indication information,

operating on the secondary link is in an awake state.

[00226] S535: The first AP sends the downlink traffic to the second STA operating on the secondary link in a unicast manner.

[00227] The downlink traffic is sent to the second STA operating on the secondary link in a unicast manner.

[00228] S536: The second STA operating on the secondary link receives the downlink traffic.

[00229] For example, the second STA operating on the secondary link may receive downlink traffic data from the first AP. The second STA operating on the secondary link may forward the received downlink traffic data to the second STA operating on the primary link.

[00230] It may be understood that, when the first AP transmits, over the secondary link, the downlink multicast traffic to the second STA operating on the primary link, the second STA operating on the secondary link sends the fourth frame to the first AP after entering an awake state, to indicate the first AP to send the downlink multicast traffic to the second STA operating on the secondary link in a unicast manner. Then, the second STA operating on the secondary link receives the downlink ~~multicast~~ unicast traffic transmitted by the first AP on the secondary link. The second STA operating on the secondary link may forward the received downlink traffic data to the second STA operating on the primary link.

[00231] An embodiment of this application further provides an association identifier AID allocation method. As shown in FIG. 13, the method includes steps S1301 to S1305.

[00232] S1301: A first STA sends an association request frame to a first AP.

[00233] The association request frame carries at least one of a quantity of second STAs to which AIDs are to be allocated or identifier information of a link on which the second STA operates.

[00234] For example, the second STAs to which AIDs are to be allocated may be some or all second STAs in the first STA. The first STA may add, to the association request frame, the quantity of second STAs to which AIDs are to be allocated, and/or identifier information of a link on which each second STA to which an AID is to be allocated operates.

[00235] Optionally, the association request frame may also carry capability (capability) information of the first STA, where the capability information includes all second STAs included in the first STA, and the identifier information of the link on which each second STA operates. It may be understood that when the association request frame carries the capability information of the first STA, it may be considered that the first STA implicitly indicate the first AP to allocate

The AP multi-link device may alternatively group the link 1 and the link 3 as the candidate link set. An example in which the AP multi-link device groups the link 1 and the link 2 as the candidate link set is merely used for description herein. The one or more candidate links include the link 1 and the link 2.

5 **[00257]** S1402: The first AP sends candidate link set information to the first STA.

[00258] For example, the candidate link set information may include identifier information of the one or more candidate links. The candidate link set information may be carried in a beacon frame or another management frame.

[00259] Optionally, the beacon frame or the another management frame may further carry
10 channel utilization information corresponding to the candidate link.

[00260] Optionally, the candidate link set information in step S1402 and downlink traffic indication information in step S503 may be carried in one beacon frame, or may be carried in different beacon frames.

[00261] Optionally, the first AP may send capability information of the first AP to the first STA,
15 where the capability information of the first AP includes all links on which the first AP can operate, and the first STA may use all the links in the capability information as candidate links, to determine a primary link from the links included in the first capability information.

[00262] S1403: The first STA receives the candidate link set information from the first AP.

[00263] Correspondingly, that the first STA determines a primary link in step S501 includes:
20 The first STA determines the primary link from the one or more candidate links based on the candidate link set information.

[00264] With reference to FIG. 6, for example, the candidate link set information includes identifier information of the link 1 and the link 2. The first STA may determine the link 2 as the primary link based on channel utilization information corresponding to the link 1 and the link 2.

25 **[00265]** Optionally, in this embodiment of this application, the first STA may group some or all links on which the first STA can operate as the candidate link set, and send information about the candidate link set to the first AP. Then, the first AP determines the primary link from the candidate link set, and sends identifier information of the primary link determined by the first AP to the first STA. In this implementation, the primary link determined by the first STA in step S501 may be a
30 primary link that is determined by the first AP and received by the first STA from the first AP. A specific manner in which the first STA determines the primary link is not limited in this

CLAIMS

What is claimed is:

1. A communication method between multi-link devices, applied to a first station STA multi-link device, wherein the first STA multi-link device comprises ~~a plurality of~~ one or more second STAs, the one or more second STAs share an association identifier AID, ~~one second STA operates on one of a plurality of links, and~~ the method comprises:

~~determining, by the first STA, a primary link, wherein the plurality of links comprise the primary link; and~~

~~receiving, by the first STA multi-link device a second STA operating on the primary link in the first STA, downlink traffic indication information sent by a first access point AP multi-link device, wherein the downlink traffic indication information comprises at least one of information used to indicate whether the first STA multi-link device the second STA operating on the primary link has a downlink traffic or information used to indicate whether a second STA operating on a secondary link has a downlink traffic;~~

~~determining, by the first STA multi-link device based on the downlink traffic indication information, whether the one or more second STAs to receive the downlink traffic, and the secondary link comprises a link other than the primary link in the plurality of links.~~

2. The method according to claim 1, wherein the downlink traffic is a downlink unicast traffic or a downlink multicast traffic, and the method further comprises:

~~when the second STA operating on the primary link determines, based on the downlink traffic indication information, that the second STA operating on the secondary link has a downlink unicast traffic, sending, by the second STA operating on the secondary link, a first frame to the first AP, wherein the first frame is used to indicate that the second STA operating on the secondary link is in an awake state; or~~

~~when the second STA operating on the primary link determines, based on the downlink traffic indication information, that the second STA operating on the secondary link has a downlink multicast traffic, receiving, by the second STA operating on the secondary link, the downlink multicast traffic from the first AP.~~

~~3. The method according to claim 1, wherein the downlink traffic is a downlink multicast traffic, and the method further comprises:~~

~~when the second STA operating on the primary link determines, based on the downlink traffic indication information, that the second STA operating on the secondary link has a downlink multicast traffic, receiving, by the second STA operating on the primary link, the downlink multicast traffic from the first AP; or~~

5 ~~when the second STA operating on the primary link determines, based on the downlink traffic indication information, that the second STA operating on the primary link has a downlink multicast traffic, receiving, by the second STA operating on the primary link, the downlink multicast traffic from the first AP.~~

4. ~~The method according to any one of claims 1 to 3, wherein the method further comprises: sending, by the first STA, an association request frame to the first AP, wherein the association request frame carries at least one of a quantity of second STAs to which association identifiers AIDs are to be allocated or identifier information of a link on which the second STA to which an AID is to be allocated operates; and~~

10 ~~receiving, by the first STA, an association response frame from the first AP, wherein the association response frame carries an AID allocated to the second STA to which the AID is to be allocated, wherein one AID is allocated to the second STA operating on the primary link, and one or two AIDs are allocated to the second STA operating on the secondary link.~~

5. ~~The method according to claim 4, wherein a link over which the first STA sends the association request frame to the first AP is the primary link, or the association request frame further carries identifier information of the primary link.~~

6. ~~The method according to any one of claims 1 to 5, wherein the method further comprises: sending, by the first STA, a management frame to the first AP, wherein the management frame carries the identifier information of the primary link.~~

7. ~~The method according to any one of claims 1 to 6, wherein the downlink traffic indication information is carried in a TIM element field in a beacon management frame or a traffic indication map TIM frame, the TIM frame further comprises a TIM element field, the TIM element field comprises a partial virtual bitmap field, the partial virtual bitmap field comprises a bit that corresponding to the AID, the bit is used to indicate whether the first STA multi-link device has a downlink unicast traffic.~~

3. The method according to claim 1 or 2, wherein the method further comprises:
30 sending, by a second STA, a media access control MAC frame to the first AP multi-link device, wherein the MAC frame comprises a frame control field, the frame control field comprises power

management information which is configured to indicate whether a second STA affiliated with the first STA MLD is in a power-saving mode or a non-power-saving mode, the setting of the power-saving mode or the non-power-saving mode of the second STA is independent of the setting of the other second STAs of the first multi-link STA.

5 4. The method according to claim 2, the management frame further comprises a multi-link identifier bitmap field, the multi-link identifier bitmap field is used to indicate one or more links of the first STA multi-link device to receive the downlink traffic.

5. The method according to claim 4, wherein one bit in the multi-link identifier bitmap field correspond to one link; and

10 when a value of the bit is 1, indicating the link corresponding to the bit to receive the downlink traffic, or when a value of the bit is 0, indicating the link corresponding to the bit not to receive the downlink traffic.

6. The method according to any one of claims 2 to 5, wherein the management frame comprises a beacon frame or a TIM frame.

15 7. The method according to any one of claims 1 to 6, wherein the method further comprises: receiving, by a second STA, the downlink traffic indication information on a primary link or a secondary link, at least one of a field indicating identifier information of a link, a beacon check field, or a field indicating a quantity of links, and the beacon check field is used to indicate whether a key parameter is updated for a link indicated by the identifier information of the link.

20 ~~8. The method according to any one of claims 4 to 7, wherein the identifier information comprises one or more of the following information:~~

~~an operating class and a channel number corresponding to the link;~~

~~a media access control MAC address of the link; or~~

~~an identifier of the link.~~

25 ~~9. The method according to any one of claims 1 to 8, wherein the method further comprises: receiving, by the first STA, candidate link set information from the first AP, wherein the candidate link set information comprises identifier information of one or more candidate links; and correspondingly, the determining, by the first STA, a primary link comprises: determining, by the first STA, the primary link from the one or more candidate links based on the candidate link set information.~~

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~~10. The method according to claim 9, wherein the one or more candidate links belong to one~~

~~basic service set BSS, each candidate link belongs to one BSS, or a part of the one or more candidate links belongs to one BSS, wherein an AID allocated to one second STA in one BSS is unique.~~

~~11. A communication method between multi-link devices, wherein the method comprises:~~

~~obtaining, by a first access point AP, identifier information of a primary link determined by a first station STA, wherein the first STA comprises a plurality of second STAs, one second STA operates on one of a plurality of links, and the plurality of links comprise the primary link; and~~

~~sending, by a first access point AP multi-link device the first AP, downlink traffic indication information to a first station STA multi-link device, wherein the first STA multi-link device comprises one or more second STAs, the one or more second STAs share an association identifier AID, a second station STA operating on the primary link in the first STA, wherein the downlink traffic indication information comprises at least one of information used to indicate whether the first STA multi-link device second STA operating on the primary link has a downlink traffic;~~

~~sending, by the first AP multi-link device, the downlink traffic or information used to indicate whether a second STA operating on a secondary link has a downlink traffic; and the secondary link comprises a link other than the primary link in the plurality of links.~~

~~12. The method according to claim 11, wherein the method further comprises:~~

~~receiving, by the first AP, an association request frame from the first STA, wherein the association request frame carries at least one of a quantity of second STAs to which association identifiers AIDs are to be allocated or identifier information of a link on which the second STA to which an AID is to be allocated operates;~~

~~allocating, by the first AP, an AID to the second STA to which the AID is to be allocated, wherein one AID is allocated to the second STA operating on the primary link, and one or two AIDs are allocated to the second STA operating on the secondary link; and~~

~~sending, by the first AP, an association response frame to the first STA, wherein the association response frame carries the AID allocated to the second STA to which the AID is to be allocated.~~

~~13. The method according to claim 12, wherein a link over which the first AP receives the association request frame is the primary link, or the association request frame further carries the identifier information of the primary link.~~

~~14. The method according to claim 11 or 12, wherein the obtaining, by a first AP, identifier~~

information of a primary link comprises:

~~receiving, by the first AP, a management frame from the first STA, wherein the management frame carries the identifier information of the primary link; and~~

~~obtaining, by the first AP, the identifier information of the primary link based on the management frame.~~

159. The method according to ~~any one of claims 11 to 148~~, wherein the downlink traffic indication information is carried in a TIM element field in a ~~beacon management frame or a traffic indication map TIM frame~~, the TIM ~~element field~~ frame further comprises a partial virtual bitmap field, the partial virtual bitmap field comprises a bit that corresponding to the AID, the bit is used to indicate whether the first STA multi-link device has a downlink unicast traffic.

10. The method according to claim 8 or 9, wherein the method further comprises:

receiving, by the first AP multi-link device, a media access control MAC frame, wherein the MAC frame comprises a frame control field, the frame control field comprises power management information which is configured to indicate whether a second STA affiliated with the first STA MLD that sent the MAC frame is in a power-saving mode or a non-power-saving mode, the setting of the power-saving mode or the non-power-saving mode of the second STA is independent of the setting of the other second STAs of the first multi-link STA.

~~at least one of a field indicating identifier information of a link, a beacon check field, or a field indicating a quantity of links, and if a key parameter is updated for a link indicated by the identifier information of the link, a value of the beacon check field is incremented by 1.~~

11. The method according to claim 9, the management frame further comprises a multi-link identifier bitmap field, the multi-link identifier bitmap field is used to indicate one or more links of the first STA multi-link device to receive the downlink traffic.

12. The method according to claim 11, wherein the multi-link identifier bitmap field comprises one or more bits, one bit in the one or more bits correspond to one link; and

when a value of the bit is 1, indicating the link corresponding to the bit to receive the downlink traffic, or when a value of the bit is 0, indicating the link corresponding to the bit not to receive the downlink traffic.

13. The method according to any one of claims 9 to 12, wherein the management frame comprises a beacon frame or a TIM frame.

14. The method according to any one of claims 8 to 13, wherein the method further comprises:

sending, by the first AP multi-link device, the downlink traffic indication information on a primary link or a secondary link.

~~16. The method according to any one of claims 11 to 15, wherein the identifier information comprises one or more of the following information:~~

- ~~an operating class and a channel number corresponding to the link;~~
- ~~a media access control MAC address of the link; or~~
- ~~an identifier of the link.~~

~~17. The method according to any one of claims 11 to 16, wherein the method further comprises:~~

~~determining, by the first AP, one or more candidate links, wherein the one or more candidate links comprise the primary link; and~~

~~sending, by the first AP, candidate link set information to the first STA, wherein the candidate link set information comprises identifier information of the one or more candidate links.~~

~~18. The method according to claim 17, wherein the method further comprises:~~

- ~~establishing, by the first AP, a basic service set BSS for the one or more candidate links;~~
- ~~establishing, by the first AP, one BSS for each candidate link; or~~
- ~~establishing, by the first AP, one BSS for a part of the one or more candidate links, wherein an AID allocated to one second STA in one BSS is unique.~~

~~19. A communications apparatus, applied to a first station STA multi-link device, wherein the first STA multi-link device comprises a plurality of one or more second STAs, the one or more second STAs share an association identifier AID ~~One second STA operates on one of a plurality of links, and the apparatus configured to~~ first STA comprises:~~

~~a processing unit, configured to determine a primary link, wherein the plurality of links comprise the primary link; and~~

~~a transceiver unit, configured to receive downlink traffic indication information sent by a first access point AP multi-link device, wherein the downlink traffic indication information comprises at least one of information used to indicate whether first STA multi-link device ~~a second STA operating on the primary link has a downlink traffic or information used to indicate whether a second STA operating on a secondary link has a downlink traffic; and the secondary link comprises a link other than the primary link in the plurality of links.~~~~

a processing unit, configured to determine whether the one or more second STAs to receive

the downlink traffic based on the downlink traffic indication information.

20. ~~The apparatus according to claim 19, wherein the downlink traffic is a downlink unicast traffic or a downlink multicast traffic;~~

~~the transceiver unit is further configured to: when the processing unit determines, based on the downlink traffic indication information, that the second STA operating on the secondary link has a downlink unicast traffic, send a first frame to the first AP, wherein the first frame is used to indicate that the second STA operating on the secondary link is in an awake state; and~~

~~the transceiver unit is further configured to: when the processing unit determines, based on the downlink traffic indication information, that the second STA operating on the secondary link has a downlink multicast traffic, receive the downlink multicast traffic from the first AP.~~

21. ~~The apparatus according to claim 19, wherein the downlink traffic is a downlink multicast traffic;~~

~~the transceiver unit is further configured to: when the processing unit determines, based on the downlink traffic indication information, that the second STA operating on the secondary link has a downlink multicast traffic, receive the downlink multicast traffic from the first AP; or~~

~~the transceiver unit is further configured to: when the processing unit determines, based on the downlink traffic indication information, that the second STA operating on the primary link has a downlink multicast traffic, receive the downlink multicast traffic from the first AP.~~

22. ~~The apparatus according to any one of claims 19 to 21, wherein the transceiver unit is further configured to:~~

~~send an association request frame to the first AP, wherein the association request frame carries at least one of a quantity of second STAs to which association identifiers AIDs are to be allocated or identifier information of a link on which the second STA to which an AID is to be allocated operates; and~~

~~receive an association response frame from the first AP, wherein the association response frame carries an AID allocated to the second STA to which the AID is to be allocated, wherein one AID is allocated to the second STA operating on the primary link, and one or two AIDs are allocated to the second STA operating on the secondary link.~~

23. ~~The apparatus according to claim 22, wherein a link over which the transceiver unit sends the association request frame to the first AP is the primary link, or the association request frame further carries identifier information of the primary link.~~

24. ~~The apparatus according to any one of claims 19 to 23, wherein the transceiver unit is further configured to:~~

~~send a management frame to the first AP, wherein the management frame carries the identifier information of the primary link.~~

2516. ~~The apparatus according to any one of claims 19 to 245, wherein the downlink traffic indication information is carried in a TIM element field in a beacon management frame or a traffic indication map TIM frame, the TIM frame further element field comprises a partial virtual bitmap field, the partial virtual bitmap field comprises a bit that corresponding to the AID, the bit is used to indicate whether the first STA multi-link device has a downlink unicast traffic.~~

17. ~~The apparatus according to claim 15 or 16, wherein the apparatus further configured to:~~
~~the transceiver unit configured to send a media access control MAC frame to the first AP multi-link device, wherein the MAC frame comprises a frame control field, the frame control field comprises power management information which is configured to indicate whether a second STA affiliated with the first STA MLD is in a power-saving mode or a non-power-saving mode, the setting of the power-saving mode or the non-power-saving mode of the second STA is independent of the setting of the other second STAs of the first multi-link STA.~~

18. ~~The apparatus according to claim 16, the management frame further comprises a multi-link identifier bitmap field, the multi-link identifier bitmap field is used to indicate one or more links of the first STA multi-link device to receive the downlink traffic.~~

19. ~~The apparatus according to claim 18, wherein one bit in the multi-link identifier bitmap field correspond to one link; and~~
~~when a value of the bit is 1, indicating the link corresponding to the bit to receive the downlink traffic, or when a value of the bit is 0, indicating the link corresponding to the bit not to receive the downlink traffic.~~

20. ~~The apparatus according to any one of claims 16 to 19, wherein the management frame comprises a beacon frame or a TIM frame.~~

21. ~~The apparatus according to any one of claims 15 to 20, wherein the apparatus further further configured to:~~

~~the transceiver unit configured to receive the downlink traffic indication information on a primary link or a secondary link, at least one of a field indicating identifier information of a link, a beacon check field, or a field indicating a quantity of links, and the beacon check field is used to~~

indicate whether a key parameter is updated for a link indicated by the identifier information of the link.

26. The apparatus according to any one of claims 22 to 25, wherein the identifier information comprises one or more of the following information:

- an operating class and a channel number corresponding to the link;
- a media access control MAC address of the link; or
- an identifier of the link.

27. The apparatus according to any one of claims 22 to 26, wherein the transceiver unit is further configured to receive candidate link set information from the first AP, wherein the candidate link set information comprises identifier information of one or more candidate links; and correspondingly, that the processing unit is further configured to: determine, by the processing unit, the primary link from the one or more candidate links based on the candidate link set information received by the transceiver unit.

28. The apparatus according to claim 27, wherein the one or more candidate links belong to one basic service set BSS, each candidate link belongs to one BSS, or a part of the one or more candidate links belongs to one BSS, wherein an AID allocated to one second STA in one BSS is unique.

29. A communications apparatus, wherein the apparatus configured to comprises:

a processing unit, configured to obtain identifier information of a primary link determined by a first station STA, wherein the first STA comprises a plurality of second STAs, one second STA operates on one of a plurality of links, and the plurality of links comprise the primary link; and

a transceiver unit, configured to send downlink traffic indication information to a first station STA multi-link device, wherein the first STA multi-link device comprises one or more second STAs, the one or more second STAs share an association identifier AID a second station STA operating on the primary link in the first STA, wherein the downlink traffic indication information comprises at least one of information used to indicate whether the first STA multi-link device the second STA operating on the primary link has a downlink traffic or information used to indicate whether a second STA operating on a secondary link has a downlink traffic; and the secondary link comprises a link other than the primary link in the plurality of links.

the transceiver unit, further configured to send the downlink traffic.

30. The apparatus according to claim 29, wherein

~~the transceiver unit is further configured to receive an association request frame from the first STA, wherein the association request frame carries at least one of a quantity of second STAs to which association identifiers AIDs are to be allocated or identifier information of a link on which the second STA to which an AID is to be allocated operates;~~

5 ~~the processing unit is further configured to allocate an AID to the second STA to which the AID is to be allocated, wherein one AID is allocated to the second STA operating on the primary link, and one or two AIDs are allocated to the second STA operating on the secondary link; and~~

~~the transceiver unit is further configured to send an association response frame to the first STA, wherein the association response frame carries the AID allocated to the second STA to which the AID is to be allocated.~~

10 ~~31. The apparatus according to claim 30, wherein a link over which the transceiver unit receives the association request frame is the primary link, or the association request frame further carries the identifier information of the primary link.~~

~~32. The apparatus according to claim 29 or 30, wherein~~
15 ~~the transceiver unit is further configured to receive a management frame from the first STA, wherein the management frame carries the identifier information of the primary link; and~~
~~the processing unit is specifically configured to obtain the identifier information of the primary link based on the management frame.~~

20 ~~323. The apparatus according to any one of claims 29 to 322, wherein the downlink traffic indication information is carried in a TIM element field in a beacon management frame or a traffic indication map TIM frame, the TIM frame further element field comprises a partial virtual bitmap field, the partial virtual bitmap field comprises a bit that corresponding to the AID, the bit is used to indicate whether the first STA multi-link device has a downlink unicast traffic.~~

25 ~~24. The apparatus according to claim 22 or 23, wherein the apparatus further configured to:~~
~~the transceiver unit further configured to receive a media access control MAC frame, wherein the MAC frame comprises a frame control field, the frame control field comprises power management information which is configured to indicate whether a second STA affiliated with the first STA MLD that sent the MAC frame is in a power-saving mode or a non-power-saving mode, the setting of the power-saving mode or the non-power-saving mode of the second STA is~~
30 ~~independent of the setting of the other second STAs of the first multi-link STA.~~

~~at least one of a field indicating identifier information of a link, a beacon check field, or a~~

field indicating a quantity of links, and if a key parameter is updated for a link indicated by the identifier information of the link, a value of the beacon check field is incremented by 1.25. The apparatus according to claim 23, the management frame further comprises a multi-link identifier bitmap field, the multi-link identifier bitmap field is used to indicate one or more links of the first

5 STA multi-link device to receive the downlink traffic.

26. The apparatus according to claim 25, wherein the multi-link identifier bitmap field comprises one or more bits, one bit in the one or more bits correspond to one link; and

when a value of the bit is 1, indicating the link corresponding to the bit to receive the downlink traffic, or when a value of the bit is 0, indicating the link corresponding to the bit not to receive
10 the downlink traffic.

27. The apparatus according to any one of claims 23 to 26, wherein the management frame comprises a beacon frame or a TIM frame.

28. The apparatus according to any one of claims 22 to 27, wherein the apparatus further configured to:

15 the transceiver unit further configured to send the downlink traffic indication information on a primary link or a secondary link.

34. The apparatus according to any one of claims 29 to 33, wherein the identifier information comprises one or more of the following information:

an operating class and a channel number corresponding to the link;

20 a media access control MAC address of the link; or

an identifier of the link.

35. The apparatus according to any one of claims 29 to 34, wherein

the processing unit is further configured to determine one or more candidate links, wherein the one or more candidate links comprise the primary link; and

25 the transceiver unit is further configured to send candidate link set information to the first STA, wherein the candidate link set information comprises identifier information of the one or more candidate links.

36. The apparatus according to claim 35, wherein the processing unit is further configured to:

establish a basic service set BSS for the one or more candidate links;

30 establish one BSS for each candidate link; or

establish one BSS for a part of the one or more candidate links, wherein

an AID allocated to one second STA in one BSS is unique.

~~37. A communications apparatus, wherein the communications apparatus comprises:~~

~~a processor, configured to execute instructions, to implement the communication method between multi-link devices according to any one of claims 1 to 18.~~

5 ~~38. A communications apparatus, wherein the communications apparatus comprises:~~

~~a transceiver, configured to send and receive information, or configured to communicate with another network element; and~~

~~a processor, configured to execute instructions, to implement the communication method between multi-link devices according to any one of claims 1 to 18.~~

10 ~~39. A communications apparatus, wherein the communications apparatus comprises:~~

~~a transceiver, configured to send and receive information, or configured to communicate with another network element;~~

~~a memory, configured to store computer-executable instructions; and~~

15 ~~a processor, configured to execute the computer-executable instructions, to implement the communication method between multi-link devices according to any one of claims 1 to 18.~~

~~4029. A chip system, wherein the chip system comprises a processor and an interface circuit, and the processor is configured to communicate with another apparatus by using the interface circuit, to implement the communication method between multi-link devices according to any one of claims 1 to 1418.~~

20 ~~4130. A computer-readable storage medium, wherein the computer-readable storage medium has computer program code, and when the computer program code is run on a processor, the processor is enabled to perform the communication method between multi-link devices according to any one of claims 1 to 1418.~~

25 ~~4231. A computer program product, wherein when the computer program product is run on a computer, the computer is enabled to perform the communication method between multi-link devices according to any one of claims 1 to 1418.~~

30 ~~43. A communications system, wherein the communications system comprises a station STA and an access point AP, the STA is configured to perform the communication method between multi-link devices according to any one of claims 1 to 10, wherein the AP is configured to perform the communication method between multi-link devices according to any one of claims 11 to 18.~~