

DATA COMMUNICATIONS METHOD, APPARATUS, AND SYSTEM

TECHNICAL FIELD

Embodiments of the present invention relate to the field of wireless communications, and in particular, to a data communications method, apparatus, and system.

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BACKGROUND

A wireless fidelity (Wireless Fidelity, WiFi) technology has been widely applied in various industries. The most basic network structure of the WiFi technology is an access point (Access Point, AP) plus several stations (Station, STA). The AP provides an access service for the STA. A radio signal is used as an interaction medium between the AP and the STA. The radio signal refers to a physical frame, and generally appears in a form of a physical layer convergence procedure ~~protocol~~ (Physical Layer Convergence Procedure, PLCP) protocol packet, including a packet header and a data part, where the data part is a Media Access Control (Media Access Control, MAC) frame. Generally the MAC frame appears in the PLCP packet in a form of a MAC protocol data component or unit (MAC protocol data unit, MPDU).

15 In an existing standard, the MAC frame includes a MAC frame header, a body (Body) part, and a frame check sequence (Frame Check Sequence, FCS) part, where the body part is the data part. The MAC frame header generally includes a 2-byte frame control (Frame Control, FC) domain, a 2-byte Duration (length)/identifier (~~Identification~~Identifier, ID) subdomain, a multi-byte address subdomain, a 2-byte sequence control (Sequence Control) subdomain, a 2-byte quality of service (Quality of Service, QoS) control (Control) subdomain, and a high throughput (High Throughput) control (Control) subdomain. Therefore, the length of the MAC frame header generally reaches 24 bytes.

25 However, in an 802.11ah application scenario, for example, on a sensor network, an STA communicates with an AP very frequently, transmitted data amount is both small, possibly smaller than the MAC frame header, and a data transmission rate is very low on the sensor network. Therefore, when the MAC frame in the existing standard is used, the transmission efficiency is low, and an application requirement cannot be satisfied.

transceiver; and at least one processor, coupled to the transceiver. The transceiver is configured to receive an association request message sent by a terminal, send an association response message to the terminal, where the associationrelationship response message includes an association identifier, and receive a data frame sent by the terminal, where a format of the data frame is a simplified frame format, and a frame header of the data frame includes a source address and a destination address, where the length of the source address is shorter than the length of a Media Access Control MAC address, and the source address includes the association identifier, or the association identifier and a multicast unicast indicator, or the association identifier and a data type, or the association identifier, the data type, and the multicast unicast indicator; and the processor is configured to perform decoding processing according to the data frame.

According to another aspect, a data communications system is provided, including any one of the foregoing apparatuses.

In embodiments of the present invention, because the length of the source address in the frame header of the data frame is shorter than the length of the MAC address, the length of the data frame compared with a data frame in the prior art can be reduced. Therefore, the transmission efficiency of the data frame can be improved.

BRIEF DESCRIPTION OF DRAWINGS

To describe the technical solutions in the embodiments of the present invention more clearly, the following briefly introduces the accompanying drawings required for describing the embodiments or the prior art. Apparently, the accompanying drawings in the following description show merely some embodiments of the present invention, and a person of ordinary skill in the art may still derive other drawings from these accompanying drawings without creative efforts.

FIG. 1 is a schematic flowchart of a data communications method according to Embodiment 1 of the present invention;

FIG. 2 is a schematic flowchart of a data communications method according to Embodiment 2 of the present invention;

FIG. 3 is a schematic structural diagram of an example of a data frame according to Embodiment 3 of the present invention;

FIG. 4 is a schematic structural diagram of an example of an FC domain of a data frame according to Embodiment 4 of the present invention;

FIG. 5 is a block diagram of a data communications apparatus according to Embodiment 5 of the present invention;

FIG. 6 is a block diagram of a data communications apparatus according to Embodiment 6 of

than the length of the MAC address of the access point, and the destination address may be a hash value of the MAC address of the access point.

Optionally, as a supplement or an exception, the frame header of the data frame may further include an FC domain. The FC domain may include a protocol version subdomain. The protocol
5 version subdomain may be used to indicate a non-simplified frame format or the simplified frame format.

Optionally, as a supplement or an exception, the frame header of the data frame may further include an FC domain. The FC domain may include a simplified frame format indicator subdomain. The simplified frame format indicator subdomain may be used to indicate the non-simplified frame
10 format or the simplified frame format.

Optionally, as a supplement or an exception, the frame header of the data frame may further include an FC domain. The FC domain may include a subtype subdomain of the data frame, and does not include a frame type subdomain.

Optionally, as a supplement or an exception, the frame header of the data frame may further
15 include an FC domain. The FC domain may include a frame transmission direction subdomain. The length of the frame transmission direction subdomain is 1 bit, and may be used to indicate a transmission direction of the data frame.

Optionally, as a supplement or an exception, the association request ~~information message~~ may further include first information used to request to use the simplified frame format. The association
20 response message may further include second information used to instruct the simplified frame format to be used.

Optionally, as a supplement or an exception, the transceiver 510 is further configured to send a first message to the access point, where the first message may include the first information used to request to use the simplified frame format; and receive a second message sent by the access point,
25 where the second message may include the second information used to instruct the simplified frame format to be used.

Optionally, as a supplement or an exception, the first information may further be used to instruct the frame header not to carry a portion that is of a transmission parameter and remains unchanged during data transmission. The portion that is of the transmission parameter and remains
30 unchanged during data transmission may include at least one of the following: a data frame length subdomain and a quality of service QoS parameter subdomain.

Optionally, as a supplement or an exception, the first information may further be used to instruct whether to encrypt the data frame.

For each hardware of the apparatus 500 or an operation performed cooperatively by the

hardware and corresponding software, reference may be made to 110, 120, 130, and 140 of the method of the Embodiment 1. To avoid repetition, description is not provided again herein.

In addition, a ~~computing-computer~~ readable media (or medium) is further provided, including computer readable instructions when being executed to perform the following operations: the operations of 110, 120, 130, and 140 for executing the method in the Embodiment 1.

In addition, a computer program product is further provided, including the computer readable medium.

It should be noted that, the terminal involved in the embodiment of the present invention includes, but not limited to, electronic equipment with a wireless communications function, such as a mobile phone, mobile phone, portable computer, and tablet computer.

Embodiment 6

FIG. 6 is a block diagram of a data communications apparatus according to Embodiment 6 of the present invention. An example of an apparatus 600 in FIG. 6 is an access point, for example, may be an AP in a WiFi technology. The apparatus 600 includes a transceiver 610 and at least one processor 620. For ease of description, FIG. 6 describes only one processor, but there may be one or more processors in FIG. 6, which is not limited in the embodiment of the present invention.

The transceiver 610 is configured to receive an association request message sent by a terminal; send an association response message to the terminal, where the ~~association~~relationship response message includes an association identifier; and receive a data frame sent by the terminal, where a format of the data frame is a simplified frame format, and a frame header of the data frame includes a source address and a destination address, where the length of the source address is shorter than the length of a media access control MAC address, and the source address includes the association identifier, or the association identifier and a multicast unicast indicator, or the association identifier and a data type, or the association identifier, the data type, and the multicast unicast indicator. The processor 620 is configured to perform decoding processing according to the data frame.

In the embodiment of the present invention, because the length of the source address in the frame header of the data frame is shorter than the length of the MAC address, the length of the data frame compared with a data frame in the prior art can be reduced. Therefore, the transmission efficiency of the data frame can be improved.

Optionally, as a supplement or an exception, the processor 620 is further configured to obtain the destination address included in the frame header, where the length of the destination address is shorter than the length of the MAC address of the access point, and the destination address may be a hash value of the MAC address of the access point.

CLAIMS

What is claimed is:

1. A data communications method, comprising:

sending an association request message to an access point;

5 receiving an association response message sent by the access point, wherein the association response message comprises an association identifier;

generating a data frame, wherein a format of the data frame is a simplified frame format, and a frame header of the data frame comprises a source address and a destination address, wherein the length of the source address is shorter than the length of a Media Access Control MAC address, and
10 the source address comprises the association identifier, or the association identifier and a multicast unicast indicator, or the association identifier and a data type, or the association identifier, the data type, and the multicast unicast indicator; and

sending the data frame to the access point.

2. The method according to claim 1, wherein the length of the destination address is shorter
15 than the length of the MAC address of the access point, and the destination address is a hash value of the MAC address of the access point.

3. The method according to claim 1 or 2, wherein the frame header further comprises a frame control FC domain, the FC domain comprises a protocol version subdomain, and the protocol version subdomain is used to indicate a non-simplified frame format or the simplified frame format.

20 4. The method according to claim 1 or 2, wherein the frame header further comprises an FC domain, the FC domain comprises a simplified frame format indicator subdomain, and the simplified frame format indicator subdomain is used to indicate a non-simplified frame format or the simplified frame format.

25 5. The method according to claim 1 or 2, wherein the frame header further comprises an FC domain, and the FC domain comprises a subtype subdomain of the data frame, and does not comprise a frame type subdomain.

30 6. The method according to claim 1 or 2, wherein the frame header further comprises an FC domain, the FC domain comprises a frame transmission direction subdomain, and the length of the frame transmission direction subdomain is 1 bit, and is used to indicate a transmission direction of the data frame.

7. The method according to any one of claims 1 to 6, wherein the association request message further comprises first information used to request to use the simplified frame format, and the association response message further comprises second information used to instruct the simplified

frame format to be used.

8. The method according to any one of claims 1 to 6, further comprising:

sending a first message to the access point, wherein the first message comprises first information used to request to use the simplified frame format; and

5 receiving a second message sent by the access point, wherein the second message comprises second information used to instruct the simplified frame format to be used.

9. The method according to claim 7 or 8, wherein the first information is further used to instruct the frame header not to carry a portion that is of a transmission parameter and remains unchanged during data transmission, and the portion that is of the transmission parameter and
10 remains unchanged during data transmission comprises at least one of the following: a data frame length subdomain and a quality of service QoS parameter subdomain.

10. The method according to claim 7 or 8, wherein the first information is further used to instruct whether to encrypt the data frame.

11. A data communications method, comprising:

15 receiving an association request message sent by a terminal;

sending an association response message to the terminal, wherein the association response message comprises an association identifier;

receiving a data frame sent by the terminal, wherein a format of the data frame is a simplified frame format, and a frame header of the data frame comprises a source address and a destination
20 address, wherein the length of the source address is shorter than the length of a Media Access Control MAC address, and the source address comprises the association identifier, or the association identifier and a multicast unicast indicator, or the association identifier and a data type, or the association identifier, the data type, and the multicast unicast indicator; and

performing decoding processing according to the data frame.

25 12. The method according to claim 11, wherein the performing decoding processing according to the data frame comprises:

obtaining the destination address comprised in the frame header, wherein the length of the destination address is shorter than the length of the MAC address of the access point, and the destination address is a hash value of the MAC address of the access point.

30 13. The method according to claim 11 or 12, wherein the performing decoding processing according to the data frame comprises:

obtaining a frame control FC domain comprised in the frame header, wherein the FC domain comprises a protocol version subdomain, and the protocol version subdomain is used to indicate a non-simplified frame format or the simplified frame format.

14. The method according to claim 11 or 12, wherein the performing decoding processing according to the data frame comprises:

obtaining an FC domain comprised in the frame header, wherein the FC domain comprises a simplified frame format indicator subdomain, and the simplified frame format indicator subdomain is used to indicate a non-simplified frame format or the simplified frame format.

15. The method according to claim 11 or 12, wherein the performing decoding processing according to the data frame comprises:

obtaining an FC domain comprised in the frame header, wherein the FC domain comprises a subtype subdomain of the data frame, and does not comprise a frame type subdomain.

16. The method according to claim 11 or 12, wherein the performing decoding processing according to the data frame comprises:

obtaining an FC domain comprised in the frame header, wherein the FC domain comprises a frame transmission direction subdomain, and the length of the frame transmission direction subdomain is 1 bit, and is used to indicate a transmission direction of the data frame.

17. The method according to any one of claims 11 to 16, wherein the association request message further comprises first information used to request to use the simplified frame format, and the association response message further comprises second information used to instruct the simplified frame format to be used.

18. The method according to any one of claims 11 to 16, further comprising:

receiving a first message sent by the terminal, wherein the first message comprises first information used to request to use the simplified frame format; and

sending a second message to the terminal, wherein the second message comprises second information used to instruct the simplified frame format to be used.

19. The method according to claim 17 or 18, wherein the first information is further used to instruct the frame header not to carry a portion that is of a transmission parameter and remains unchanged during data transmission, and the portion that is of the transmission parameter and remains unchanged during data transmission comprises at least one of the following: a data frame length subdomain and a quality of service QoS parameter subdomain.

20. The method according to claim 17 or 18, wherein the first information is further used to instruct whether to encrypt the data frame.

21. A data communications apparatus, comprising:

a transceiver; and

at least one processor, coupled to the transceiver;

wherein the transceiver is configured to send an association request message to an access point,

and receive an association response message sent by the access point, wherein the association response message comprises an association identifier;

the processor is configured to generate a data frame, wherein a format of the data frame is a simplified frame format, and a frame header of the data frame comprises a source address and a destination address, wherein the length of the source address is shorter than the length of a Media Access Control MAC address, and the source address comprises the association identifier, or the association identifier and a multicast unicast indicator, or the association identifier and a data type, or the association identifier, the data type, and the multicast unicast indicator; and

the transceiver is further configured to send the data frame to the access point.

22. The apparatus according to claim 21, wherein the length of the destination address is shorter than the length of the MAC address of the access point, and the destination address is a hash value of the MAC address of the access point.

23. The apparatus according to claim 21 or 22, wherein the frame header of the data frame further comprises a frame control FC domain, the FC domain comprises a protocol version subdomain, and the protocol version subdomain is used to indicate a non-simplified frame format or the simplified frame format.

24. The apparatus according to claim 21 or 22, wherein the frame header of the data frame further comprises an FC domain, the FC domain comprises a simplified frame format indicator subdomain, and the simplified frame format indicator subdomain is used to indicate a non-simplified frame format or the simplified frame format.

25. The apparatus according to claim 21 or 22, wherein the frame header of the data frame further comprises an FC domain, and the FC domain comprises a subtype subdomain of the data frame, and does not comprise a frame type subdomain.

26. The apparatus according to claim 21 or 22, wherein the frame header of the data frame further comprises an FC domain, the FC domain comprises a frame transmission direction subdomain, and the frame transmission direction subdomain has the length of 1 bit, and is used to indicate a transmission direction of the data frame.

27. The apparatus according to any one of claims 21 to 26, wherein the association request information further comprises first information used to request to use the simplified frame format, and the association response message further comprises second information used to instruct the simplified frame format to be used.

28. The apparatus according to any one of claims 21 to 26, wherein the transceiver is further configured to send a first message to the access point, wherein the first message comprises first information used to request to use the simplified frame format; and receive a second message sent

by the access point, wherein the second message comprises second information used to instruct the simplified frame format to be used.

29. The apparatus according to claim 27 or 28, wherein the first information is further used to instruct the frame header not to carry a portion that is of a transmission parameter and remain unchanged during data transmission, and the portion that is of the transmission parameter and remains unchanged during data transmission comprises at least one of the following: a data frame length subdomain and a quality of service QoS parameter subdomain.

30. The apparatus according to claim 27 or 28, wherein the first information is further used to instruct whether to encrypt the data frame.

31. A data communications apparatus, comprising:

a transceiver; and

at least one processor, coupled to the transceiver;

wherein the transceiver is configured to receive an association request message sent by a terminal; send an association response message to the terminal, wherein the relationship response message comprises an association identifier; and receive a data frame sent by the terminal, wherein a format of the data frame is a simplified frame format, and a frame header of the data frame comprises a source address and a destination address, wherein the length of the source address is shorter than the length of a Media Access Control MAC address, and the source address comprises the association identifier, or the association identifier and a multicast unicast indicator, or the association identifier and a data type, or the association identifier, the data type, and the multicast unicast indicator; and

the processor is configured to perform decoding processing according to the data frame.

32. The apparatus according to claim 31, wherein the processor is further configured to obtain the destination address comprised in the frame header, wherein the length of the destination address is shorter than the length of the MAC address of the access point, and the destination address is a hash value of the MAC address of the access point.

33. The apparatus according to claim 31 or 32, wherein the processor is further configured to obtain a frame control FC domain comprised in the frame header, the FC domain comprises a protocol version subdomain, and the protocol version subdomain is used to indicate a non-simplified frame format or the simplified frame format.

34. The apparatus according to claim 31 or 32, wherein the processor is further configured to obtain an FC domain comprised in the frame header, the FC domain comprises a simplified frame format indicator subdomain, and the simplified frame format indicator subdomain is used to indicate a non-simplified frame format or the simplified frame format.

35. The apparatus according to claim 31 or 32, wherein the processor is further configured to obtain an FC domain comprised in the frame header, and the FC domain comprises a subtype subdomain of the data frame, and does not comprise a frame type subdomain.

5 36. The apparatus according to claim 31 or 32, wherein the processor is further configured to obtain an FC domain comprised in the frame header, the FC domain comprises a frame transmission direction subdomain; and the frame transmission direction subdomain has the length of 1 bit, and is used to indicate a transmission direction of the data frame.

10 37. The apparatus according to any one of claims 31 to 36, wherein the association request message further comprises first information used to request to use the simplified frame format, and the association response message further comprises second information used to instruct the simplified frame format to be used.

15 38. The apparatus according to any one of claims 31 to 36, wherein the transceiver is further configured to receive a first message sent by the terminal, wherein the first message comprises first information used to request to use the simplified frame format; and send a second message to the terminal, wherein the second message comprises second information used to instruct the simplified frame format to be used.

20 39. The apparatus according to claim 37 or 38, wherein the first information is further used to instruct the frame header not to carry a portion that is of a transmission parameter and remains unchanged during data transmission, and the portion that is of the transmission parameter and remains unchanged during data transmission comprises at least one of the following: a data frame length subdomain and a quality of service QoS parameter subdomain.

40. The apparatus according to claim 37 or 38, wherein the first information is further used to instruct whether to encrypt the data frame.

25 41. A data communications system, comprising the apparatus according to any one of claims 21 to 30 and/or the apparatus according to any one of claims 31 to 40.

CLAIMS

What is claimed is:

1. A WiFi data communications method for a terminal, comprising:

sending (110) an association request message to an access point;

5 receiving (120) an association response message sent by the access point, wherein the association response message comprises an Association Identifier, AID, allocated by the access point;

10 generating (130) a data frame, wherein a format of the data frame is a simplified frame format, and a frame header of the data frame comprises a source address and a destination address, wherein the length of the source address is shorter than the length of a Media Access Control MAC address, and the source address comprises the AID, or the AID and a multicast unicast indicator, or the AID and a data type, or the AID, the data type, and the multicast unicast indicator; and

sending (140) the data frame to the access point.

15 2. The method according to claim 1, wherein the length of the destination address is shorter than the length of the MAC address of the access point, and the destination address is a hash value of the MAC address of the access point.

3. The method according to claim 1 or 2, wherein the frame header further comprises a frame control FC domain, the FC domain comprises a protocol version subdomain, and the protocol version subdomain is used to indicate a non-simplified frame format or the simplified frame format.

20 4. The method according to claim 1 or 2, wherein the frame header further comprises an FC domain, the FC domain comprises a frame transmission direction subdomain, and the length of the frame transmission direction subdomain is 1 bit, and is used to indicate a transmission direction of the data frame.

5. A WiFi data communications method for an access point, comprising:

25 receiving (210) an association request message sent by a terminal;

sending (220) an association response message to the terminal, wherein the association response message comprises an Association Identifier, AID, allocated by an access point;

30 receiving (230) a data frame sent by the terminal, wherein a format of the data frame is a simplified frame format, and a frame header of the data frame comprises a source address and a destination address, wherein the length of the source address is shorter than the length of a Media Access Control MAC address, and the source address comprises the AID, or the AID and a multicast unicast indicator, or the AID and a data type, or the AID, the data type, and the multicast unicast indicator; and

performing (240) decoding processing according to the data frame.

6. The method according to claim 5, wherein the performing decoding processing according to the data frame comprises:

obtaining the destination address comprised in the frame header, wherein the length of the destination address is shorter than the length of the MAC address of the access point, and the destination address is a hash value of the MAC address of the access point.

7. The method according to claim 5 or 6, wherein the performing decoding processing according to the data frame comprises:

obtaining a frame control FC domain comprised in the frame header, wherein the FC domain comprises a protocol version subdomain, and the protocol version subdomain is used to indicate a non-simplified frame format or the simplified frame format.

8. The method according to claim 5 or 6, wherein the performing decoding processing according to the data frame comprises:

obtaining an FC domain comprised in the frame header, wherein the FC domain comprises a frame transmission direction subdomain, and the length of the frame transmission direction subdomain is 1 bit, and is used to indicate a transmission direction of the data frame.

9. A WiFi data communications terminal apparatus, comprising:

a transceiver (510); and

at least one processor (520), coupled to the transceiver;

wherein the transceiver is configured to send an association request message to an access point, and receive an association response message sent by the access point, wherein the association response message comprises an Association Identifier, AID, allocated by the access point;

the processor is configured to generate a data frame, wherein a format of the data frame is a simplified frame format, and a frame header of the data frame comprises a source address and a destination address, wherein the length of the source address is shorter than the length of a Media Access Control MAC address, and the source address comprises the AID, or the AID and a multicast unicast indicator, or the AID and a data type, or the AID, the data type, and the multicast unicast indicator; and

the transceiver is further configured to send the data frame to the access point.

10. The apparatus according to claim 9, wherein the frame header of the data frame further comprises a frame control FC domain, the FC domain comprises a protocol version subdomain, and the protocol version subdomain is used to indicate a non-simplified frame format or the simplified frame format.

11. The apparatus according to claim 9, wherein the frame header of the data frame further comprises an FC domain, the FC domain comprises a frame transmission direction subdomain, and

the frame transmission direction subdomain has the length of 1 bit, and is used to indicate a transmission direction of the data frame.

12. A WiFi data communications access point apparatus, comprising:

a transceiver (610); and

5 at least one processor (620), coupled to the transceiver;

wherein the transceiver is configured to receive an association request message sent by a terminal; send an association response message to the terminal, wherein the association response message comprises an Association Identifier, AID, allocated by the apparatus; and receive a data frame sent by the terminal, wherein a format of the data frame is a simplified frame format, and a frame header of the data frame comprises a source address and a destination address, wherein the length of the source address is shorter than the length of a Media Access Control MAC address, and the source address comprises the AID, or the AID and a multicast unicast indicator, or the AID and a data type, or the AID, the data type, and the multicast unicast indicator; and

the processor is configured to perform decoding processing according to the data frame.

15 13. The apparatus according to claim 12, wherein the processor is further configured to obtain a frame control FC domain comprised in the frame header, the FC domain comprises a protocol version subdomain, and the protocol version subdomain is used to indicate a non-simplified frame format or the simplified frame format.

20 14. The apparatus according to claim 12, wherein the processor is further configured to obtain an FC domain comprised in the frame header, the FC domain comprises a frame transmission direction subdomain; and the frame transmission direction subdomain has the length of 1 bit, and is used to indicate a transmission direction of the data frame.

15. A data communications system, comprising the apparatus (500) according to any one of claims 9 to 11 and/or the apparatus (600) according to any one of claims 12 to 14.