WIRELESS NETWORK DISCOVERY METHOD AND APPARATUS

[0001] ~~This application claims priority to Chinese Patent Application No. 201210123899.7, filed with the Chinese Patent Office on April 25, 2012, and Chinese Patent Application No. 201210213398.8, filed with the Chinese Patent Office on April 25, 2012, which are incorporated herein by reference in their entireties~~.

TECHNICAL FIELD

[0002] The present invention relates to the field of wireless communications technologies, and in particular, to a wireless network discovery method and apparatus.

BACKGROUND

[0003] In an existing WiFi (Wireless Fidelity, Wireless Fidelity) technology, for an application scenario where a large number of WiFi STAs (station, station) simultaneously enter a WiFi AP (access point, access point) coverage area, before a corresponding STA and an AP establish a connection, the STA first needs to determine which WiFi APs corresponding to a WiFi network exist in the surrounding and select a WiFi AP meeting a requirement of the STA from these WiFi APs, and then executes a process of connecting to a WiFi network to which the corresponding WiFi AP belongs.

[0004] According to existing specifications, a WiFi STA may discover an AP by receiving a beacon (Beacon) message that is periodically sent by the AP by broadcasting, and may also discover a network by sending an active scan message. If an WiFi STA needs to discover a WiFi AP existing in the surrounding as soon as possible, the WiFi STA may broadcast a network probe request message (Probe request) and add, in the network probe request message, an information identifier corresponding to related information of one or more requested WiFi networks, that is, WiFi APs; and one or more APs receiving the Probe request in an adjacent area of the WiFi STA reply to the STA with a probe response message (Probe response) and include related information of the WiFi AP requested by the STA in the probe response message.

[0005] In the prior art, when broadcasting a Probe request, each STA needs to scan a plurality of channels supported by the STA one by one, send the Probe request through each channel, and wait to receive a Probe response generated by one or more APs in an adjacent area for a response. It can

when the second network probe request message is received, and waits to receive a second probe response message sent by a surrounding wireless network access point.

[0028] The preset period of time refers to a longest period of time required by a surrounding wireless network access point for sending a probe response message to a certain station after the surrounding wireless network access point receives a network probe request message sent by the station. In specific implementation, the wireless network access point may set a value of the preset period of time, or the station sending the network probe request message may set a value of the preset period of time and add the corresponding value of the preset period of time in the network probe request.

[0029] In addition, in another exemplary embodiment of the present invention, after the delaying, by the station, the first network probe request message, the method may further include:

during the preset period of time starting with a moment when the second network probe request message sent by the another station is received, if the station receives a second probe response message sent by a surrounding wireless network access point or another message used for wireless network discovery, and determines that the second probe response message or the another message used for wireless network discovery includes network information requested by the station, after the preset period of time is reached, not sending the first network probe request message, where the message used for wireless network discovery is sent by a surrounding wireless network access point and includes a message carrying wireless network information required by a station, and this type of message includes a beacon message (beacon) and the like.

[0030] Certainly, in specific implementation of the technical solutions of the present invention, application scenarios where the station needs to send the network probe request message may still exist. An example for these application scenarios is as follows: During the preset period of time, if the station determines that one or more second network probe request messages sent by another station and received by the station do not include the network information identifier requested by the station, and does not receive the another message used for wireless network discovery, after the preset period of time is reached, the station still needs to send the first network probe request message.

[0031] In addition, during the preset period of time, if the station does not receive the second probe response message sent by the surrounding wireless network access point, and does not receive the message used for wireless network discovery, after the preset period of time is reached, the station still needs to send the first network probe request message.

[0032] In the foregoing embodiment of the present invention, before sending a network probe request message, a station that needs to perform network discovery needs to detect to whether a network probe request message sent by another station exists on a channel. According to existing

specifications, the station needs to parse each received physical layer frame, obtain a MAC (Media Access Control, media access control) layer frame included in the physical layer frame, and determine whether the current MAC layer frame is a network probe request message according to frame type information in a header of the MAC layer frame. However, the existing implementation manner may cause that the station consumes more electricity. To reduce parsing operations performed by the station on a non-network-probe-request message, the embodiment of the present invention provides the following solution: A station adds indication information to a header of a physical layer frame of a message sent by the station, where the indication information is used for indicating that the current message is a network probe request message. Specifically, the indication information is used for indicating whether a data part of the physical layer frame includes a MAC layer Probe request. In actual application, the indication information may occupy one or more Bits in the header of the physical layer frame, and a determined value is used for indicating whether the data part of the physical layer frame includes the MAC layer Probe request. In this way, the station only needs to parse a frame header part of each physical layer frame and then can learn whether the physical layer frame includes the Probe request according to the indication information included in the frame header, thereby avoiding an operation of further parsing the data part of the physical layer frame to obtain a MAC layer frame content type included in the physical layer frame, and reducing electricity consumption of the station. Certainly, after the station determines that the data part of the physical layer frame includes the MAC layer Probe request frame according to the indication information in the frame header of the physical layer frame, if the station needs to obtain request information content included in the Probe request frame, the station still needs to further parse the data part of the physical layer frame, so as to obtain the request information included in the MAC layer frame.

[0033] To facilitate an understanding of the technical solutions of the present invention, the following describes an overall solution in detail by using a specific example.

[0034] FIG. 2 shows a schematic diagram of an application scenario where two stations perform wireless network discovery. An AP is an access point, an STA1 and an STA2 are two stations that perform network discovery within a coverage area of the AP. To discover a WiFi network corresponding to the AP as soon as possible, the STA1 is triggered to perform active scanning on a WiFi network. A specific process is as follows: A station management entity (SME) triggers, by using a scan request message (Scan request), a MAC layer to send a network probe request message Probe request; and the station management entity adds a pProbe delay parameter in the Scan request message, to indicate, to the MAC layer, that the MAC layer needs to wait for a period of time specified by the pProbe delay before sending the network probe request message ~~an active scan message~~ Probe request. In addition,

[0049] According to the foregoing description of the disclosed embodiments, a person skilled in the art can implement or use the present invention. Various modifications made on these embodiments are obvious to a person skilled in the art, and a general principle defined in this specification may be implemented in other embodiments without departing from the ~~spirit or~~ scope of the embodiments of the present invention. Therefore, the embodiments of the present invention are not limited to the embodiments shown in this specification, but conform to a broadest scope consistent with the principles and novel features disclosed in this specification.

determining, by the station and according to indication information carried in a physical layer frame header of a message sent by another station, that the message sent by the another station is the second network probe request message, wherein the indication information is used for indicating that the current message is the second network probe request message.

7. A station, comprising:

a detecting module, configured to: before a first network probe request message is sent to an access point, detect a current channel, and when a second network probe request message sent by another station is received on the current channel, trigger a message delaying module; and

the message delaying module, configured to delay sending the first network probe request message.

8. The station according to claim 7, wherein the message delaying module comprises:

a first message determining sub-module, configured to determine whether the second network probe request message comprises a network information identifier requested by the station; and

a probe response message waiting sub-module, configured to: when the first message determining sub-module determines that the second network probe request message comprises information requested by the station, suspend sending the first network probe request message for a preset period of time starting with a moment when the second network probe request message is received, and wait to receive a second probe response message sent by a surrounding wireless network access point.

9. The station according to claim 8, further comprising:

a second message determining sub-module, configured to: during the preset period of time, if the second probe response message or another message used for wireless network discovery is received, determine whether the second probe response message or the another message used for wireless network discovery comprises network information requested by the station, wherein the message used for wireless network discovery comprises a beacon message; and

a message canceling sub-module, configured to: when the second probe response message or the another message used for wireless network discovery comprises the network information requested by the station, after the preset period of time is reached, not send the first network probe request message.

10. The station according to claim 8 or 9, further comprising:

a message sending module, configured to: during the preset period of time, if the second probe response message is received, the message used for wireless network discovery is not received, and it is determined that the second network probe request message does not comprise the network information identifier requested by the station, after the preset period of time is reached, send the

comprising:

during the preset period of time, if the station does not receive the second probe response message, and does not receive the another message used for wireless network discovery,

after the preset period of time is reached, sending the first network probe request message.

17. The wireless network discovery method according to any one of claims 14 to 16, wherein the preset period of time is a preset period of time starting with a moment when the station receives the second network probe request message, and the second probe response message is sent by a surrounding wireless network access point.

18. The wireless network discovery method according to any one of claims 12 to 17, further comprising:

determining, by the station and according to indication information carried in a physical layer frame header of a message sent by another station, that the message sent by the another station is the second network probe request message, wherein the indication information is used for indicating that the current message is the second network probe request message.

19. A station, comprising:

a detecting module, configured to: before a first network probe request message is sent to an access point, detect a current channel, and when a second network probe request message sent by another station is received on the current channel, trigger a message delaying module; and

the message delaying module, configured to delay sending the first network probe request message; and

a message canceling sub-module, configured to cancel sending the first network probe request message.

20. The station according to claim 19, wherein the message delaying module comprises:

a first message determining sub-module, configured to determine whether the second network probe request message comprises a network information identifier requested by the station; and

a probe response message waiting sub-module, configured to: when the first message determining sub-module determines that the second network probe request message comprises information requested by the station, suspend sending the first network probe request message for a preset period of time starting with a moment when the second network probe request message is received, and wait to receive a second probe response message sent by a surrounding wireless network access point.

21. The station according to claim ~~19~~20, further comprising:

a second message determining sub-module, configured to: during the preset period of time, if the second probe response message or another message used for wireless network discovery is

received, determine whether the second probe response message or the another message used for wireless network discovery comprises network information requested by the station, wherein the message used for wireless network discovery comprises a beacon message; and

the message canceling sub-module is specifically configured to: when the second probe response message or the another message used for wireless network discovery comprises the network information requested by the station, after the preset period of time is reached, not send the first network probe request message.

22. The station according to claim ~~19 or~~ 20, further comprising:

a message sending module, configured to: during the preset period of time, if the second probe response message is received, the another message used for wireless network discovery is not received, and it is determined that the second network probe request message does not comprise the network information identifier requested by the station, after the preset period of time is reached, send the first network probe request message.

23. The station according to claim 22, wherein the message sending module is further configured to:

during the preset period of time, if the second probe response message is not received, and the another message used for wireless network discovery is not received, after the preset period of time is reached, send the first network probe request message.