



Certification of Accuracy of Translation

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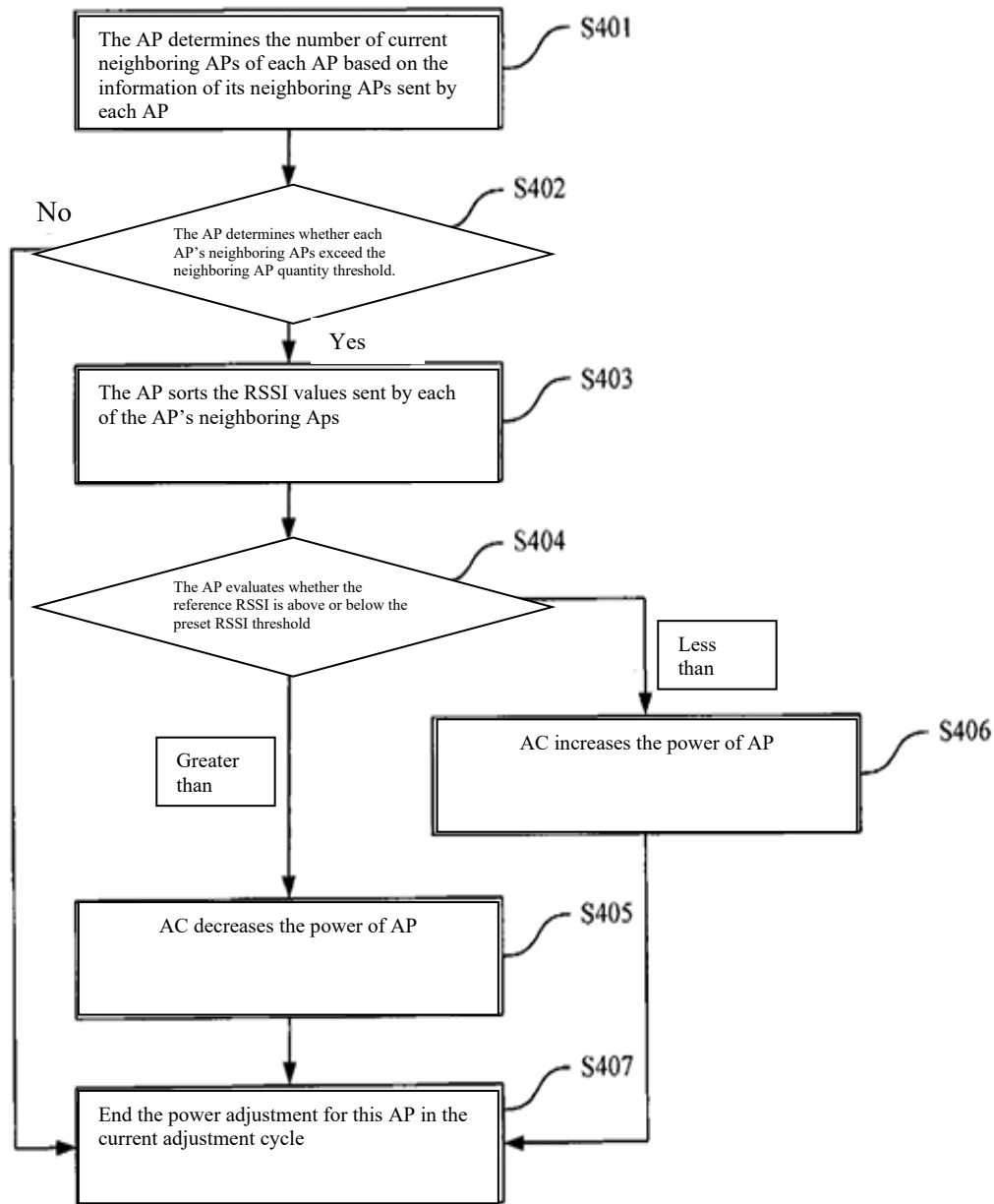
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[57] Abstract

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Cisco Systems, Inc.



1. A power adjustment method for a wireless access point (AP), which is characterized in that it is applied to a network system comprising at least two APs connected to the same wireless access controller (AC), wherein each AP determines information about its neighboring APs and determines the Received Signal Strength Indicator (RSSI) generated by the AP's signal in each neighboring AP, and the AC receives information about the neighboring APs transmitted by the AP and the RSSI generated by the AP's signal in each neighboring AP transmitted by each neighboring AP, the method comprising:

the AC determines the current number of neighboring APs of the AP based on the information of the neighboring APs sent by the AP;

when the AC determines that the number of neighboring APs corresponding to the AP exceeds a preset threshold for the number of neighboring APs, it sorts the RSSI generated by the signals of the AP sent by each neighboring AP in the neighboring APs; and

the AC selects a standard RSSI according to the sorting order and a preset selection strategy, determines its relationship with a preset RSSI threshold, and adjusts the power of the AP according to the relationship.

2. The method according to claim 1, which is characterized in that it specifically comprises:

the AC receives information about neighboring APs sent by the AP according to a preset reporting period and the RSSI generated in the neighboring APs by the signals of the APs sent by each neighboring AP according to the preset reporting period;

the AC calculates the current number of neighboring APs of the AP based on the information of neighboring APs sent by the AP, according to a preset adjustment period; and

wherein, the preset reporting period is smaller than the preset adjustment period.

3. The method according to claim 2, which is characterized in that, after the AC calculates the current number of neighboring APs for each AP based on the information of the neighboring APs sent by each AP, it further comprises:

when the AC determines that the number of neighboring APs corresponding to the AP does not exceed the preset threshold for the number of neighboring APs, the AC sets the power value of the AP to the default value and ends the power adjustment of the AP in this adjustment cycle.

4. The method according to claim 1, which is characterized in that, based on the relationship between the standard RSSI and a preset RSSI threshold, the AC adjusts the power of the AP according to a preset adjustment strategy, specifically as follows:

when the standard RSSI is greater than a preset RSSI threshold, the AC decreases the power of the AP;

when the standard RSSI is less than a preset RSSI threshold, the AC increases the power of the AP; and

wherein, the amount by which the AC increases or decreases the power of the AP is equal to the absolute value of the difference between the standard RSSI and a preset RSSI threshold, where the preset RSSI threshold is the maximum RSSI value that does not cause network interference between APs.

5. The method according to claim 4, which characterized in that the standard RSSI selected according to the preset selection strategy specifically comprises:

the AC selects the RSSI whose sorting order corresponds to the preset threshold number of neighboring APs as the standard RSSI; and

wherein the preset neighbor AP number threshold is the minimum number of APs that will cause network interference between them.

6. An AC, which is characterized in that it is applied in a network system comprising at least two APs connected to the same wireless access controller AC, comprising:

a setting module, which is used to set the threshold for the number of neighboring APs, the RSSI threshold, select a strategy, and adjust a strategy.

a communication module, which is used to receive information from neighboring APs sent by the AP and the RSSI generated by the signals of the AP sent by each neighboring AP in the neighboring AP;

a processing module, which is connected to the communication module and the setting module, and which is used to determine the current number of neighboring APs for each AP based on the information of its respective neighboring APs sent by each AP received by the communication module. When the number of neighboring APs of an AP exceeds the neighboring AP number threshold set by the setting module, the processing module sorts the RSSIs generated by the signals of each neighboring AP sent by the AP received by the communication module among the neighboring APs. Based on a selection strategy set by the setting module, the processing module selects one RSSI from the sorted list as the standard RSSI;

a judgment module, which is connected to the processing module and the setting module, and which is used to determine the relationship between the number of neighboring APs of each AP determined by the processing module and the threshold number of neighboring APs set by the setting module. When the number of neighboring APs of an AP exceeds the threshold number of neighboring APs, it is used to determine the relationship between a standard RSSI selected by the processing module and the RSSI threshold set by the setting module; and

an adjustment module, which is connected to the judgment module and the setting module, and which is used to adjust the power of the AP according to the adjustment strategy set by the setting module based on the relationship between the standard RSSI determined by the judgment module and the RSSI threshold set by the setting module.

7. The AC according to claim 6, which is characterized in that

the setting module is also used to set the adjustment cycle;

the processing module is used to calculate the current number of neighboring APs for each AP according to the adjustment period set by the setting module 81 and the information of each AP's neighboring APs sent by each AP according to the preset reporting period; and

the preset reporting period is smaller than the adjustment period set by the setting module.

8. The AC according to claim 6, which is characterized in that

the adjustment module adjusts the power of the AP according to the adjustment strategy set by the setting module based on the relationship between the standard RSSI determined by the judgment module and the RSSI threshold set by the setting module, specifically:

when the judgment module determines that the standard RSSI is greater than the RSSI threshold set by the setting module, the adjustment module decreases the power of the AP;

when the judgment module determines that the standard RSSI is less than the RSSI threshold set by the setting module, the adjustment module increases the power of the AP;

wherein, the adjustment module increases or decreases the power of the AP by an amount equal to the absolute value of the difference between the standard RSSI and a preset RSSI threshold, wherein the preset RSSI threshold is the maximum RSSI value that does not cause network interference between APs.

9. The AC according to claim 6, which is characterized in that the processing module

selects a standard RSSI according to the selection strategy set by the setting module. Specifically:

the processing module selects the RSSI whose sorting order corresponds to the threshold number of neighboring APs set by the setting module as the standard RSSI;

wherein, the threshold for the number of neighboring APs set by the configuration module is the minimum number of APs required to cause network interference between APs.

AP power adjustment methods and device

Technical Field

The present invention relates to the field of communication technology, and in particular to a power adjustment method and device for an access point (AP).

Background Technology

Wireless LANs have recently been used more and more widely and deeply, becoming an increasingly important enterprise-level LAN solution.

Access points (APs) are commonly used devices for building small wireless local area networks (WLANs). An AP acts as a bridge between wired and wireless networks, its main function being to connect various wireless network clients together and then connect the wireless network to the Ethernet. Based on the differences in the functions integrated into the AP itself, existing technologies are divided into FAT AP networking structures and AC (Access Controller) + FIT AP networking structures.

Among them, the FAT AP networking structure is a common existing networking structure, and its schematic diagram is shown in FIG. 1.

In this FAT AP networking mode, the AP connects to the wired network via a switch, and all related functions are performed on the AP itself. Therefore, this AP is called a FAT AP, including dynamic key generation, L2 roaming handover, authentication termination, etc. This places a high demand on the AP's processing power, requiring it to handle complex business operations. Functional upgrades are achieved by upgrading the AP's software version.

Based on the above examples, FAT AP networking is characterized in that:

The AP itself has powerful functions, such as dynamic key generation, L2 roaming switching, and authentication termination, all of which can be completed on the AP itself.

The network management software provides unified and centralized management of all APs in the network.

802.1x authentication termination can be completed by the AP itself or by the switch. Web authentication can also be completed by the AP itself or by the switch. It can be used in conjunction with the backend authentication and billing system for monthly billing or billing based on time or traffic.

Due to the characteristics of the inherent principles of FAT APs, they are typically suitable for building small-scale Wireless Local Area Networks (WLANs) that only require data access services, or for projects that use WLANs for localized hotspot coverage.

As the number of access points (APs) in existing wireless networks gradually increases, a series of problems have also arisen. Interference between APs is one of the most significant issues affecting the quality of wireless network communication. The ability to automatically adjust AP power based on the network environment, thus reducing interference and improving the overall system throughput, has become an effective way to solve this problem.

Traditional radio frequency power control methods simply set the transmit power to the maximum value statically, solely pursuing signal coverage. However, excessive power may cause unnecessary interference to other wireless devices. Therefore, it is necessary to select an optimal power that balances coverage and system capacity.

Currently, there is no standard or universal standard for technology to automatically adjust power in real time according to the wireless environment, and most APs will use the default maximum power.

In the process of developing the present invention, the applicant discovered that the prior art has at least the following problems:

In existing technical solutions, APs generally use the default maximum power. This increases network conflicts when there are multiple APs in the network, thereby reducing the system throughput.

Summary of the Invention

The present invention provides a power adjustment method and device for an access point (AP), which automatically adjusts the power in real time in a wireless environment to reduce network interference and improve system throughput.

To achieve the above objectives, the present invention provides a power adjustment method for a wireless access point (AP), applied to a network system comprising at least two APs connected to the same wireless access controller (AC). Each AP determines information about its neighboring APs and determines the Received Signal Strength Indicator (RSSI) generated by the AP's signal in each neighboring AP. The AC receives information about the neighboring APs transmitted by the AP and the RSSI generated by the AP's signal in each neighboring AP. The method comprises:

The AC determines the current number of neighboring APs of the AP based on the information of the neighboring APs sent by the AP.

When the AC determines that the number of neighboring APs corresponding to the AP exceeds a preset threshold for the number of neighboring APs, it sorts the RSSI generated by the signals of the AP sent by each neighboring AP in the neighboring APs.

The AC selects a standard RSSI according to the sorting order and a preset selection strategy, determines its relationship with a preset RSSI threshold, and adjusts the power of the AP according to the relationship.

The preset selection strategy is to select RSSIs whose sorting order corresponds to the preset threshold number of neighboring APs; the preset threshold number of neighboring APs is the minimum number of APs that can cause network interference between APs.

Preferably, the method specifically comprises:

The AC receives information about neighboring APs sent by the AP according to a preset reporting period and the RSSI generated in the neighboring APs by the signals of the APs sent by each neighboring AP according to the preset reporting period.

The AC calculates the current number of neighboring APs of the AP based on the information of neighboring APs sent by the AP according to a preset adjustment period;

The preset reporting period is smaller than the preset adjustment period.

Preferably, after calculating the current number of neighboring APs for each AP based on the information of their respective neighboring APs sent by each AP, the AC further comprises:

When the AC determines that the number of neighboring APs corresponding to the AP does not exceed the preset threshold for the number of neighboring APs, the AC sets the power value of the AP to the default value and ends the power adjustment of the AP in this adjustment cycle.

Preferably, based on the relationship between the standard RSSI and a preset RSSI threshold, the AC adjusts the power of the AP according to a preset adjustment strategy, specifically:

When the standard RSSI is greater than a preset RSSI threshold, the AC decreases the power of the AP;

When the standard RSSI is less than a preset RSSI threshold, the AC increases the power of the AP; and

Wherein, the amount by which the AC increases or decreases the power of the AP is equal to the absolute value of the difference between the standard RSSI and a preset RSSI threshold, where the preset RSSI threshold is the maximum RSSI value that does not cause network interference between APs.

Preferably, a standard RSSI is selected according to the preset selection strategy, specifically:

The AC selects, according to the sorting order, the RSSI whose sorting order corresponds to the preset threshold number of neighboring APs as the standard RSSI; and

Wherein the preset threshold number of neighboring APs is the minimum number of APs that can cause network interference between APs.

On the other hand, the present invention also provides a wireless controller AC, applied in a network system comprising at least two wireless access points (APs) connected to the same wireless access controller AC, comprising:

A settings module, which is used to set the threshold for the number of neighboring APs, the RSSI (Received Signal Strength Indicator) threshold, select a strategy, and adjust a strategy;

A communication module, which is used to receive information from neighboring APs sent by the AP and the RSSI generated by the signals of the AP sent by each neighboring AP in the neighboring AP;

A processing module, which is connected to the communication module and the setting module, and which is used to determine the current number of neighboring APs for each AP based on the information of its respective neighboring APs sent by each AP received by the communication module. When the number of neighboring APs of an AP exceeds the neighboring AP number threshold set by the setting module, the processing module sorts the RSSIs generated by the signals of each neighboring AP sent by the AP received by the communication module among the neighboring APs. Based on a selection strategy set by the setting module, the processing module selects one RSSI from the sorted list as the standard RSSI;

A judgment module, which connected to the processing module and the setting module, and which is used to determine the relationship between the number of neighboring APs of each AP determined by the processing module and the threshold number of neighboring APs set by the setting module, and when the number of neighboring APs of an AP exceeds the threshold number of neighboring APs, to determine the relationship between a standard RSSI selected by the processing module and the RSSI threshold set by the setting module.

An adjustment module, which is connected to the judgment module and the setting module, and which is used to adjust the power of the AP according to the adjustment strategy set by the setting module based on the relationship between the standard RSSI determined by the judgment module and the RSSI threshold set by the setting module.

Preferably, the setting module is further configured to set an adjustment cycle;

The processing module is used to calculate the current number of neighboring APs for each AP according to the adjustment period set by the setting module and the information of each AP's neighboring APs sent according to the preset reporting period; and

Wherein, the preset reporting period is smaller than the adjustment period set by the setting module.

Preferably, the adjustment module adjusts the power of the AP according to the adjustment strategy set by the setting module based on the relationship between the standard RSSI determined by the judgment module and the RSSI threshold set by the setting module. Specifically:

When the judgment module determines that the standard RSSI is greater than the RSSI threshold set by the setting module, the adjustment module decreases the power of the AP; and

When the judgment module determines that the standard RSSI is less than the RSSI threshold set by the setting module, the adjustment module increases the power of the AP; and

Wherein, the adjustment module increases or decreases the power of the AP by an amount equal to the absolute value of the difference between the standard RSSI and a preset RSSI threshold, where the preset RSSI threshold is the maximum RSSI value that does not cause network interference between APs.

Preferably, the processing module selects the RSSI whose sorting order corresponds to the threshold number of neighboring APs set by the setting module as the standard RSSI; and

Wherein, the threshold for the number of neighboring APs set by the configuration module is the minimum number of APs required to cause network interference between APs.

Compared with the prior art, the present invention has the following advantages:

By applying the technical solution of the present invention, the AC collects information on each AP in the current wireless network in real time and performs automatic power adjustments periodically based on the collected information. When there are many APs in the network, resulting in high interference, the AC automatically decreases the power of the APs to reduce interference. Conversely, when there are few APs in the network, which may lead to insufficient wireless network coverage, the AC automatically increases the power of the APs to ensure the coverage of the wireless network.

Description of attached figures

FIG. 1 is a schematic diagram of the network topology model of a typical wireless network in the prior art;

FIG. 2 is a schematic diagram of the network before AP power adjustment in the prior art;

FIG. 3 is a schematic diagram of a network after AP power adjustment in the prior art;

FIG. 4 is a schematic flowchart of the AP power adjustment method proposed in the present invention;

FIG. 5 is a schematic diagram of the network structure before adjustment according to the AP power adjustment method proposed in the present invention;

FIG. 6 is a schematic diagram of the network structure after adjustment according to the AP power adjustment method proposed in the present invention;

FIG. 7 is a flowchart illustrating the AP power adjustment method in a specific application scenario proposed in the present invention.

FIG. 8 is a schematic diagram of the AC structure proposed in the present invention.

Detailed Implementation

According to the background section, as the number of access points (APs) in a network increases, with an increase in the coverage area, interference also occurs between the APs. When there are a large number of APs in the network, such interference will affect the network performance.

As shown in FIG. 2, too many APs were deployed in the same area, and each AP was transmitting signals at maximum power, resulting in significant interference between APs and affecting the performance of the entire area.

Furthermore, as shown in FIG. 3, the technical idea of the present invention is to reduce the power of each AP by adjusting the power, while not significantly affecting the sum of the coverage areas generated by each AP. Therefore, the effective range of the communication network can be guaranteed.

To perform power adjustment, it is crucial to determine when and how to perform the power adjustment, which is an important problem that the present invention aims to solve.

In the present invention, the AC will arrange for the AP to scan the network in real time and collect information about neighboring APs in the network. When the number of neighboring APs of an AP reaches the pre-configured threshold for the number of neighboring APs, the AC considers that there are too many APs in the network and needs to adjust the power of each AP.

In a wireless network, each AP can sense the signal strength of other APs in the vicinity, and the surrounding APs can also sense the signal strength of this AP. That is, APs that are neighbors can sense each other.

If the surrounding access points (APs) sense a strong signal from another AP, then the terminal devices around the AP will also sense a strong signal from the AP. In this case, it is necessary to reduce the AP's power to avoid interference; conversely, it is necessary to increase the AP's power to improve communication quality.

Therefore, when adjusting power, the AC will consider the signal strength of the neighboring APs. If the perceived signal strength is too strong, it means that the AP's power needs to be reduced; conversely, it means that the AP's power needs to be increased.

As for the intensity of the adjustment, it is necessary to ensure that the intensity of the AP sensed by the neighboring AP after the adjustment is not less than the specified threshold value (in the present invention, it is represented by the RSSI threshold).

If the strength of the neighboring AP sensed by the AP is less than the threshold value after adjustment, it indicates that the AP power is low, which may reduce the coverage area and reduce network performance.

Meanwhile, to ensure coverage, the AC will sort the neighboring APs in descending order of their perceived signal strength, find a standard signal strength, and adjust the AP's power accordingly. This ensures that at least a number of neighboring APs (set according to actual needs) perceive an AP signal strength greater than the threshold, thus guaranteeing coverage.

Based on the above technical concept, the present invention provides a power adjustment method for an AP, which is applied to a network system including at least two APs connected to the same wireless access controller (AC). Each AP measures the information of its neighboring APs, and each neighboring AP determines the RSSI generated by the corresponding AP signal in that neighboring AP. The AC receives the information of each AP about its neighboring APs and the RSSI generated by the AP signal in that neighboring AP.

Wherein, RSSI (Received Signal Strength Indication) is an optional part of the wireless transmission layer, used to determine link quality and whether to increase broadcast transmission strength. In the present invention, this parameter is used to determine the degree of signal interference between access points (APs).

In practical applications, if there are other parameters that can achieve the same technical effect, they can also be applied to the technical solution of the present invention, and this also falls within the protection scope of the present invention.

As shown in FIG. 4, the method specifically comprises the following steps:

Step S401: The AC determines the current number of neighboring APs for each AP based on the information of each AP's neighboring APs sent by each AP.

It should be noted that the specific implementation process of this step is as follows:

The AC receives information about each AP's neighboring APs sent by each AP according to a preset reporting period, as well as RSSI generated in each neighboring AP by the signals of that AP sent by each neighboring AP according to the preset reporting period;

The AC calculates the current number of neighboring APs for each AP according to the preset adjustment cycle and the information of each AP sent by each AP; and

Wherein, the preset reporting period is smaller than the preset adjustment period, thus ensuring that the same situation will not be adjusted repeatedly.

Step S402: the AC determines whether the number of neighboring APs corresponding to each AP exceeds the preset threshold for the number of neighboring APs.

When the AC determines that the number of neighboring APs corresponding to an AP exceeds the preset threshold for the number of neighboring APs, step S403 is executed; and

When the AC determines that the number of neighboring APs corresponding to an AP exceeds the preset threshold for the number of neighboring APs, step S407 is executed.

Step S403: The AC sorts the RSSI generated by the signals of the AP sent by each of the AP's neighboring APs in each neighboring AP.

Step S404: AC selects a standard RSSI according to the sorting order and a preset selection strategy, and determines its relationship with the preset RSSI threshold.

Wherein, in specific application scenarios, the selection of a standard RSSI can be carried out according to the following process:

According to the sorting order performed in step S403, the AC selects the RSSI corresponding to the sorting order and the preset threshold of the number of neighboring APs as the standard RSSI.

The preset threshold for the number of neighboring APs is the minimum number of APs required to cause network interference between APs, and the preset threshold for RSSI is the maximum RSSI value that does not cause network interference between APs.

Based on the relationship between the standard RSSI and the preset RSSI threshold, the AC adjusts the AP's power according to a preset adjustment strategy. The specific adjustment strategy is explained below:

When the standard RSSI is greater than the preset RSSI threshold, execute step S405; and

When the standard RSSI is less than the preset RSSI threshold, execute step S406.

Step S405: AC decreases AP power.

Step S406: AC increases AP power.

In steps S405 and S406 above, the magnitude of any increase or decrease by AC of the AP power is equal to the absolute value of the difference between the standard RSSI and the preset RSSI threshold. In addition, after step S405 or step S406 is completed, the process proceeds directly to step S407.

Step S407: End the power adjustment of the AP within this adjustment cycle.

It should be noted that when the AC determines that the number of neighboring APs corresponding to an AP does not exceed the preset threshold for the number of neighboring APs, the AC can set the AP's power value to the default value, or it can directly keep the existing power unchanged and end the power adjustment of the AP in this adjustment cycle. Such changes do not affect the scope of protection of the present invention.

It should be pointed out that step S401 above can be regarded as the beginning of an adjustment cycle, and step S407 can be regarded as the end of the power adjustment process of an AP in the adjustment cycle.

To ensure that the AP power adjustment can adapt to the continuous changes in the wireless network, the power adjustment process is continuously cycled according to the adjustment cycle. That is, after step S407 is completed, the AC restarts step S401 in the next adjustment cycle.

Compared with the prior art, the present invention has the following advantages: By applying the technical solution of the present invention, the AC collects information on each AP in the current wireless network in real time and performs automatic power adjustment periodically based on the collected information. When there are many APs in the network, resulting in high interference, the AC automatically decreases the power of the APs to reduce interference. Conversely, when there are few APs in the network, which may lead to insufficient wireless network coverage, the AC automatically increases the power of the APs to ensure the coverage of the wireless network.

Next, the technical solution of the present invention will now be described in conjunction with specific application scenarios.

In the network structure shown in FIG. 5, there are 5 APs connected to the AC, and each AP provides wireless service at the default maximum power.

According to the technical solution of the present invention, each AP collects environmental information and reports it to the AC at a certain period.

Through the above reporting process, AC can obtain the following information:

AP1 has 4 neighboring APs, while AP2, AP3, AP4, and AP5 each have 3 neighboring APs.

Assume that the threshold for the number of neighboring APs in the current wireless network is set to 3, then since each AP has more than 3 neighboring APs, the AC will adjust the power value of each AP.

As shown in FIG. 6, after the power adjustment process is completed, the coverage of the wireless network remains basically unchanged, but due to the lower signal strength, the interference in the wireless network is reduced, thereby improving the throughput of the entire wireless network.

The process of the AP power adjustment method proposed in the present invention will be described in detail below, as shown in FIG. 7:

Step S701: The AC collects the neighbor AP information of each AP in the current wireless network.

In order to automatically adjust power, the AC needs to know the neighboring AP information of each AP. Each AP in the current wireless network scans a channel to find out which APs are around and the RSSI of this AP as perceived by these neighboring APs.

Then, the AP reports this information to the AC.

Because the network environment may change, the AP's neighboring AP information will be periodically reported to the AC.

After each AP reports its neighbor information, the AC has a comprehensive understanding of the neighbor information of each AP.

The AC will periodically perform automatic power adjustments for each AP in the current wireless network.

In practical applications, the power adjustment period can be set and adjusted according to actual application needs. However, the power adjustment period should be longer than the reporting period for each AP to report neighbor AP information in the aforementioned steps. This ensures that the AC will not repeatedly adjust the power for the same network scenario, thus avoiding resource waste.

The specific algorithm for power adjustment is as follows:

Step S702: The AC calculates the number of neighboring APs for each AP in the current network.

Step S703: The AC determines whether the number of neighboring APs of each AP exceeds the preset threshold N for the number of neighboring APs.

If the number of neighboring APs of an AP does not exceed the preset threshold N for the number of neighboring APs, then execute step S704; and

If the number of neighboring APs of an AP exceeds the preset threshold N for the number of neighboring APs, then execute step S705.

Step S704: The AC restores the AP's power to the default value.

At this point, the power adjustment of the AP within this adjustment cycle is complete, and the process proceeds to step S709.

Step S705: The AC sorts the RSSIs reported by each of the neighboring APs corresponding to the AP in descending order.

Each neighboring AP of an AP records the RSSI of messages sent from the AP and reports it to the AC.

The AC sorts the RSSI reported by all neighboring APs in descending order based on the RSSI value. Then, it finds the Nth largest RSSI value, marks the neighboring AP that reported this RSSI as NAP-nth, and records the RSSI of the AP it senses as RSSI-nth. This is determined as the standard RSSI and used as the basis for subsequent adjustments.

Step S706: The AC determines the relationship between the standard RSSI (RSSI-nth) reported by AP's NAP-nth and the preset RSSI threshold.

Wherein, the RSSI threshold can be set and adjusted according to the needs of the actual application scenario, and is marked as RSSI-threshold.

If RSSI-nth is greater than RSSI-threshold, the current AP power is considered to be high, and execute step S707; and

If RSSI-nth is less than RSSI-threshold, the current AP power is considered low, and execute step S708.

Step S707: The AC decreases AP power.

Assume the power of the AP before adjustment is P-before, and the power of the AP after adjustment is P-after.

The algorithm for reducing AP power by AC is as follows:

$P\text{-after} = P\text{-before} - (\text{RSSI-nth} - \text{RSSI-threshold})$.

After the adjustment is completed, proceed to step S709.

Step S708: The AC increases the power of the AC to the AP.

Assume the power of the AP before adjustment is P-before, and the power of the AP after adjustment is P-after.

The algorithm for increasing the power of the AC to the AP is as follows:

$P\text{-after} = P\text{-before} + (\text{RSSI-threshold} - \text{RSSI-nth})$.

After the adjustment is completed, proceed to step S709.

Step S709: The adjustment of AP by AC is completed.

It should be noted that step S701 above can be regarded as the beginning of an adjustment cycle, and step S709 can be regarded as the end of the power adjustment process of an AP in the adjustment cycle.

To ensure that the AP power adjustment can adapt to the continuous changes in the wireless network, the power adjustment process is continuously cycled according to the adjustment cycle. That is, after step S709 is completed, the AC restarts step S701 in the next adjustment cycle.

Such adjustments ensure that when the AP's power is too high, it will be reduced to a lower value, and when the AP's power is too low, it will be reduced to a higher value. This guarantees both wireless coverage and avoids excessive interference.

To achieve the above technical solution, the present invention also provides an AC, applied to a network system comprising at least two APs connected to the same AC, the structural diagram of which is shown in FIG. 8, including:

The setting module 81, which is used to set the threshold for the number of neighboring APs, the RSSI threshold, the selection strategy, and the adjustment strategy;

The communication module 82, which is used to receive information from each neighboring AP sent by the AP and the RSSI generated in each neighboring AP by the signals of the AP sent by each neighboring AP;

The processing module 83, which is connected to the communication module 82 and the setting module 81, and used to determine the current number of neighboring APs of each AP based on the information of each AP sent by each AP received by the communication module 82. When the number of neighboring APs of an AP exceeds the threshold of the number of neighboring APs set by the setting module 81, the processing module 83 sorts the RSSIs generated by the signals of the AP sent by each neighboring AP of the AP received by the communication module 82 in the neighboring APs, and selects one RSSI in the sorted order as the standard RSSI according to the selection strategy set by the setting module 81;

The judgment module 84, which is connected to the processing module 83 and the setting module 81. It is used to determine the relationship between the current number of neighboring APs of each AP determined by the processing module 83 and the threshold for the number of neighboring APs set by the setting module 81, and when the number of neighboring APs of an AP exceeds the threshold for the number of neighboring APs, it determines the relationship between a standard RSSI selected by the processing module 83 and the RSSI threshold set by the setting module;

The adjustment module 85, which is connected to the judgment module 84 and the setting module 81. It is used to adjust the power of the AP according to the adjustment strategy set by the setting module 81 based on the relationship between the standard RSSI judged by the judgment module 84 and the RSSI threshold set by the setting module 81;

In specific application scenarios, the setting module 81 is also used to set the adjustment cycle;

Correspondingly, the processing module 83 is used to calculate the current number of neighboring APs for each AP according to the adjustment period set by the setting module 81 and the information of each AP's neighboring APs sent by each AP according to the preset reporting period; and

Wherein, the preset reporting period is smaller than the adjustment period set by the setting module 81.

In specific application scenarios, the adjustment module 85 adjusts the AP's power according to the relationship between the standard RSSI determined by the judgment module 84 and the RSSI threshold set by the setting module 81, and follows the adjustment strategy set by the setting module 81. Specifically:

When the judgment module 84 judges that the standard RSSI is greater than the RSSI threshold set by the setting module 81, the adjustment module 85 decreases the power of the AP;

When the judgment module 84 judges the standard RSSI less than the RSSI threshold set by the setting module 81, the adjustment module 85 increases the power of the AP; and

Wherein, the adjustment module increases or decreases the AP's power by an amount equal to the absolute value of the difference between the standard RSSI and the preset RSSI threshold. The RSSI threshold set by the setting module 83 is the maximum RSSI value that does not cause network interference between APs.

In a specific application scenario, the processing module 83 selects a standard RSSI according to the selection strategy set by the setting module 81, specifically:

The processing module 83 selects the RSSI corresponding to the neighbor AP number threshold set by the setting module 81 as the standard RSSI according to the sorting order.

The threshold for the number of neighboring APs set by the setting module 83 is the minimum number of APs required to cause network interference between APs.

Compared with the prior art, the present invention has the following advantages:

By applying the technical solution of the present invention, the AC collects information on each AP in the current wireless network in real time and performs automatic power adjustment periodically based on the collected information. When there are many APs in the network, resulting in high interference, the AC automatically decreases the power of the APs to reduce interference. Conversely, when there are few APs in the network, which may lead to insufficient wireless network coverage, the AC automatically increases the power of the APs to ensure the coverage of the wireless network.

Through the above description of the embodiments, those skilled in the art will clearly understand that the present invention can be implemented in hardware or by means of software plus necessary general-purpose hardware platforms. Based on this understanding, the technical solution of the present invention can be embodied in the form of a software product, which can be stored in a non-volatile storage medium (such as a CD-ROM, USB flash drive, external hard drive, etc.) and comprises several instructions to cause a computer device (such as a personal computer, server, or network device, etc.) to execute the methods described in the various embodiments of the present invention.

Those skilled in the art will understand that the accompanying drawings are merely schematic diagrams of a preferred embodiment, and the modules or processes shown in the drawings are not necessarily essential for implementing the present invention.

Those skilled in the art will understand that the modules in the apparatus of the implementation scenario can be distributed within the apparatus of the implementation scenario as described, or they can be located in one or more apparatuses different from this implementation scenario, with corresponding changes. The modules of the above-described implementation scenario can be combined into one module, or they can be further divided into multiple sub-modules.

The serial numbers of the present invention mentioned above are for descriptive purposes only and do not represent the superiority or inferiority of the implementation scenarios.

The above-disclosed examples are only a few specific implementation scenarios of the present invention. However, the present invention is not limited thereto, and any variations that can be conceived by those skilled in the art should fall within the protection scope of the present invention.

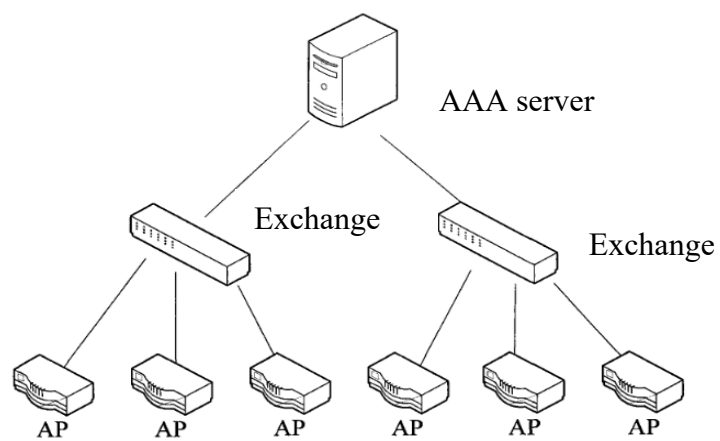


FIG. 1

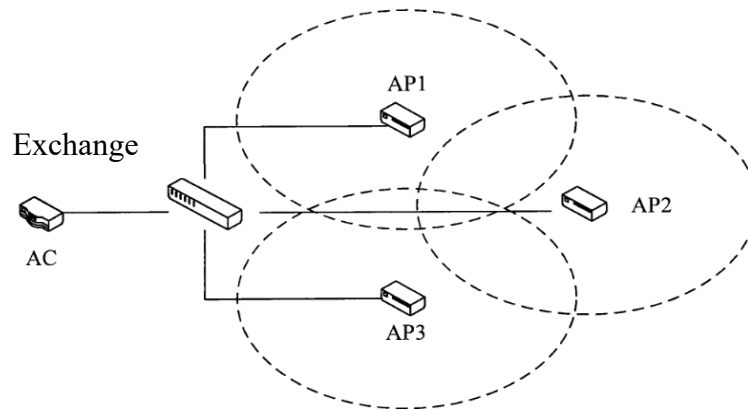


FIG. 2

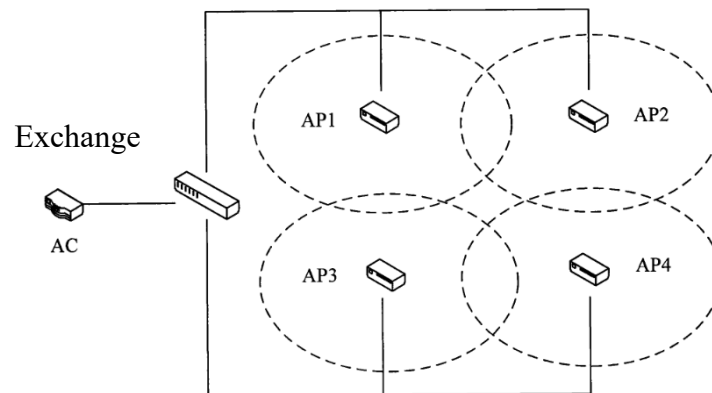


FIG. 3

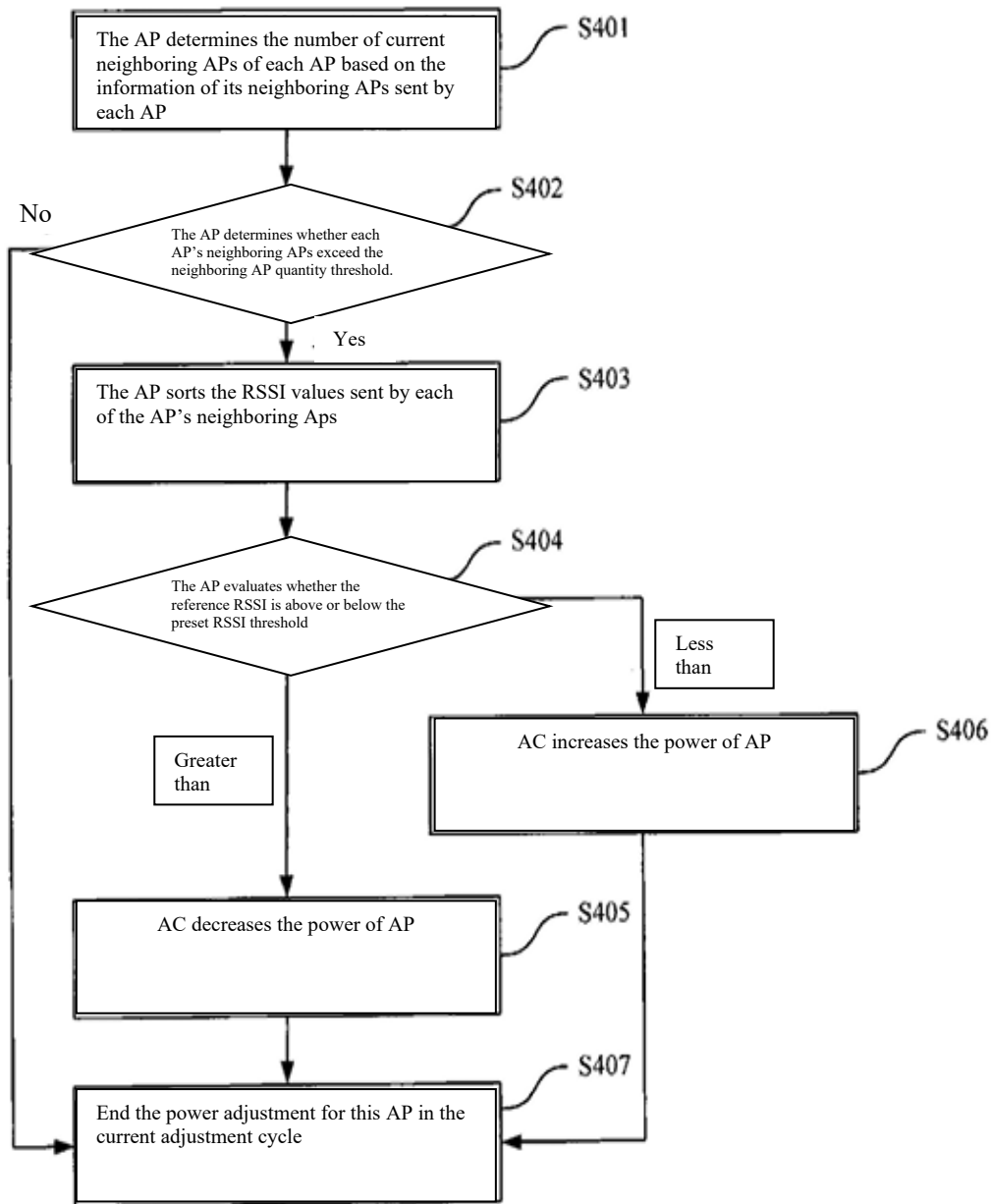


FIG. 4

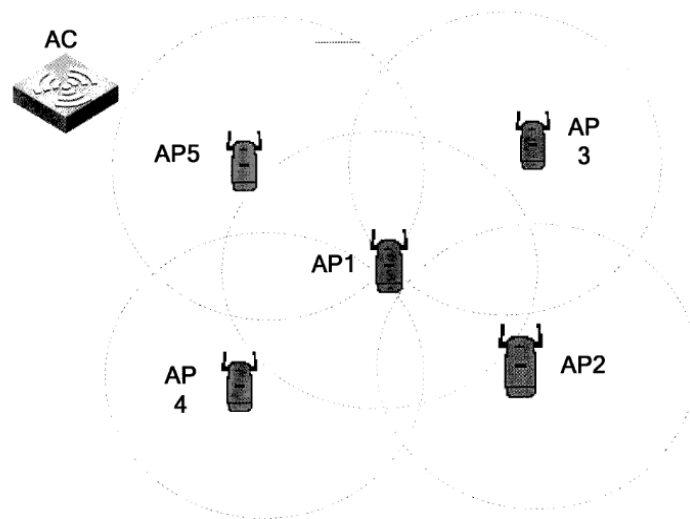


FIG. 5

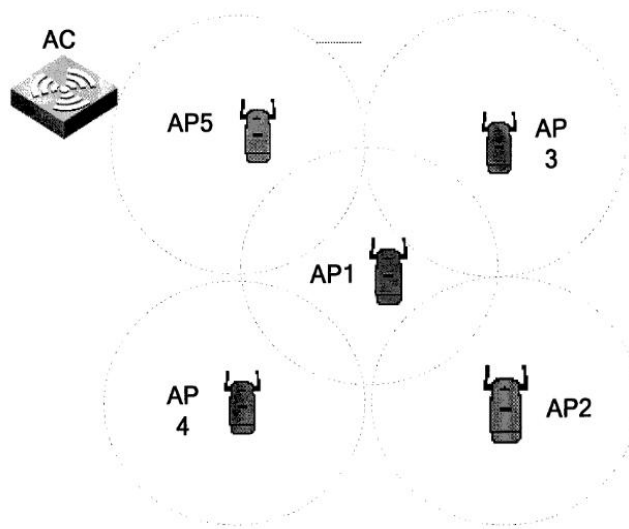


FIG. 6

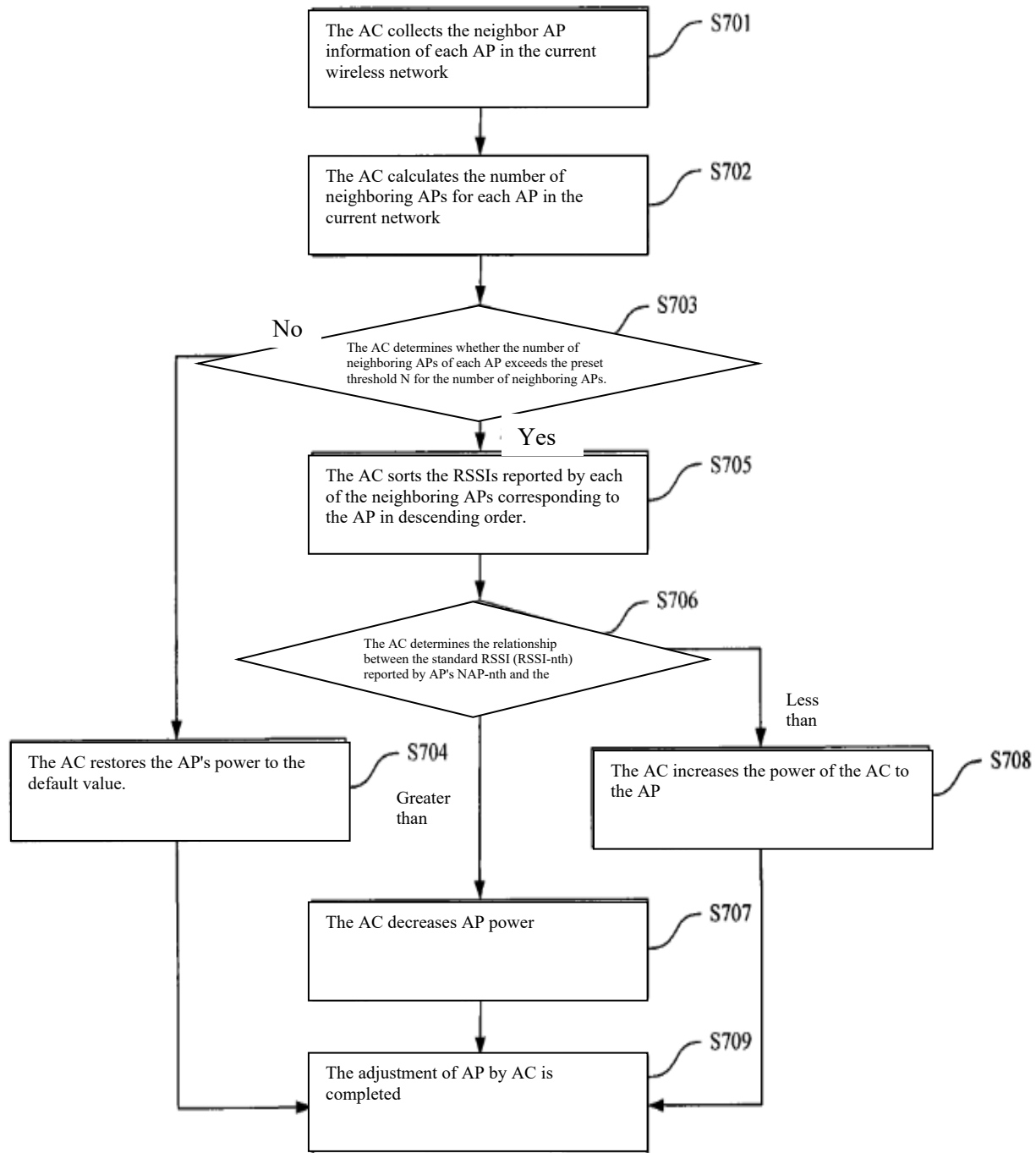


FIG. 7

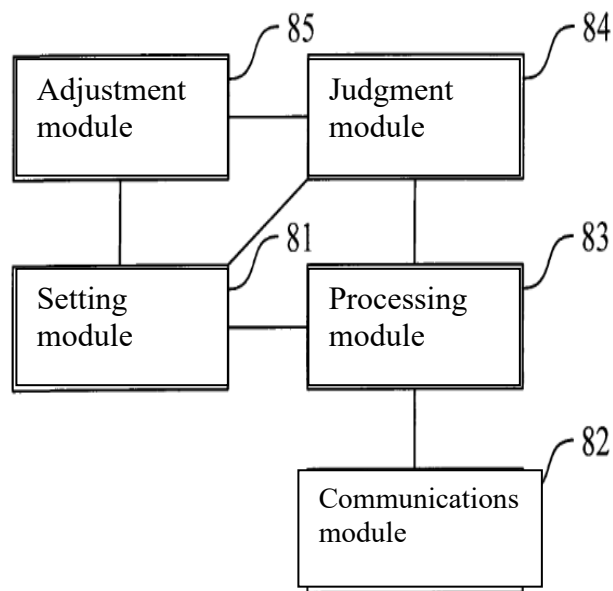


FIG. 8