

DYNAMIC FREQUENCY ALLOCATION METHOD FOR BASE STATION, SHELF LABEL SYSTEM AND COMPUTER DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

5 **[0001]** This application claims priority to Chinese Patent Application No. 202210496841.0, filed on May 09, 2022, which is hereby incorporated by reference in its entirety.

TECHNICAL FIELD

10 **[0002]** The present application relates to a field of communication technology, and particularly, to a dynamic frequency allocation method for a base station, a shelf label system and a computer device.

BACKGROUND

15 **[0003]** With the increasing application of the electronic shelf label system in various retail fields and the increasing scale of stores, a plurality of base stations need to be deployed in the stores. Due to the limited frequency resources of the 2.4G ISM frequency band, currently in the field of electronic shelf label systems, fixed frequencies are usually manually allocated to a plurality of base stations during the frequency resources allocation therefor, which causes the
20 problems such as frequency use conflicts or strong signal interferences among the base stations in different electronic shelf label systems, thereby leading to the reduction of the communication success rate or even the communication failure of the electronic shelf label systems.

[0004] It can be seen that in the prior art, the method for allocating frequencies to a
25 plurality of base stations in an electronic shelf label system has the problems of frequency use conflicts or strong signal interferences among the base stations, which reduces the communication stability of the electronic shelf label system and cannot meet the actual needs of stores with a plurality of base stations.

SUMMARY

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[0005] Aiming at the defects in the prior art, the present application provides a dynamic frequency allocation method for a base station, a shelf label system and a computer device, which solves the problem in the prior art that the method for allocating frequencies to a plurality

of base stations in an electronic shelf label system has frequency use conflicts or strong signal interferences among the base stations. The present application not only meets different real-time requirements of customers for different task priorities, but also prevents the problems of frequency use conflicts and mutual interferences between the base stations and maximizes the communication throughput of the base stations in limited frequency resources, thereby improving the stability and the data throughput capacity of the electronic shelf label system.

[0006] In a first aspect, the present application provides a dynamic frequency allocation method for a base station. The method is applicable to a shelf label system and includes: obtaining, based on ranging results among base stations in a store, a current connectivity topological structure of all the base stations; obtaining a current weight degree of each base station based on a frequency interval weight between every two base stations in the current connectivity topological structure; performing priority classification on all current base stations to obtain a current priority type of each base station based on base stations corresponding to respective docking tasks in a current batch docking task list and priority types of the docking tasks; obtaining a current allocated frequency of each base station based on the current priority type of the base station, the current weight degree of the base station, the frequency interval weight and a current available frequency set; and transmitting, by each base station, a corresponding docking task to an electronic shelf label based on a current allocated frequency, and releasing, by each base station, the current allocated frequency, so that during issuance of a next-round batch docking task list, each base station is dynamically re-allocated with a frequency based on the current available frequency set.

[0007] Optionally, obtaining the current allocated frequency of each base station based on the current priority type of the base station, the current weight degree of the base station, the frequency interval weight and the current available frequency set includes: taking the base station with the current priority type of high priority and having a maximum current weight degree among base stations without frequency allocation, as a current first target base station; obtaining a plurality of first frequency-allocated base stations connected to the current first target base station based on the current first target base station; selecting a first target frequency as a current allocated frequency of the current first target base station from the current available frequency set based on a plurality of first allocated frequencies corresponding to the plurality of first frequency-allocated base stations. A difference between the first target frequency and each first allocated frequency is greater than or equal to the corresponding frequency interval weight.

[0008] Optionally, obtaining the current allocated frequency of each base station based

on the current priority type of the base station, the current weight degree of the base station, the frequency interval weight and the current available frequency set further includes: taking the base station with the current priority type of low priority and having a maximum current weight degree among base stations without frequency allocation, as a current second target base station, after frequency allocation for the base station with the current priority type of high priority is completed; obtaining a plurality of second frequency-allocated base stations connected to the current second target base station based on the current second target base station; selecting a second target frequency as a current allocated frequency of the current second target base station from the current available frequency set based on a plurality of second allocated frequencies corresponding to the plurality of second frequency-allocated base stations. A difference between the second target frequency and each second allocated frequency is greater than or equal to the corresponding frequency interval weight.

[0009] Optionally, the method further includes: storing the docking task corresponding to the current first target base station or the current second target base station in a current unfinished task list, if the first target frequency or the second target frequency is not existed in the current available frequency set; performing a task integration on the current unfinished task list and a next-round docking task list newly received to obtain the next-round batch docking task list.

[0010] Optionally, the task integration includes, but is not limited to, adjusting the priority type of each task in the current unfinished task list to high priority.

[0011] Optionally, the method further includes: scanning, by each base station in the store, each frequency point in a preset frequency set to obtain signal scanning power of each base station for each frequency point; and comparing each signal scanning power with a preset threshold power, and forming the current available frequency set using the frequency points corresponding to the signal scanning power less than the preset threshold power.

[0012] Optionally, obtaining, based on ranging results among base stations in the store, the current connectivity topological structure of all the base stations includes: controlling all the base stations in the store to transmit ranging signals in turn; obtaining the ranging results between each base station and other base stations based on intensity of feedback signals transmitted from the other base stations to the base station; and establishing the current connectivity topological structure of the base stations based on the ranging results among all the base stations.

[0013] Optionally, obtaining the current weight degree of each base station based on the frequency interval weight between every two base stations in the current connectivity

topological structure includes: taking a current base station as a target node, and obtaining all connected base stations connected to the target node based on the current connectivity topological structure; and accumulating the frequency interval weights between the target node and all connected base stations to obtain a current weight degree of the current base station.

5 **[0014]** In a second aspect, the present application provides a shelf label system, includes a server, base stations and an electronic shelf label. The server is configured to obtain, based on ranging results among base stations in a store, a current connectivity topological structure of all the base stations. The server is further configured to obtain a current weight degree of each base station based on a frequency interval weight between every two base stations in the current
10 connectivity topological structure. The server is further configured to perform priority classification on all current base stations to obtain a current priority type of each base station based on base stations corresponding to respective docking tasks in a current batch docking task list and priority types of the docking tasks. The server is further configured to obtain a current allocated frequency of each base station based on the current priority type of the base station,
15 the current weight degree of the base station, the frequency interval weight and a current available frequency set. Each base station is configured to transmit a corresponding docking task to an electronic shelf label based on the current allocated frequency, and to release the current allocated frequency after transmitting the corresponding docking task, so that during issuance of a next-round batch docking task list, each base station is dynamically re-allocated
20 with a frequency based on the current available frequency set.

[0015] In a third aspect, the present application provides a computer device, including a memory, a processor and a computer program stored in the memory and executable on the processor. the processor is configured to execute the computer program to implement the steps of: obtaining, based on ranging results among base stations in a store, a current connectivity
25 topological structure of all the base stations; obtaining a current weight degree of each base station based on a frequency interval weight between every two base stations in the current connectivity topological structure; performing priority classification on all current base stations to obtain a current priority type of each base station based on base stations corresponding to respective docking tasks in a current batch docking task list and priority types of the docking
30 tasks; obtaining a current allocated frequency of each base station based on the current priority type of the base station, the current weight degree of the base station, the frequency interval weight and a current available frequency set; and transmitting, by each base station, a corresponding docking task to an electronic shelf label based on the current allocated frequency, and releasing, by each base station, the current allocated frequency, so that during issuance of

a next-round batch docking task list, each base station is dynamically re-allocated with a frequency based on the current available frequency set.

[0016] Compared with the prior art, the present application has the following advantageous effects:

5 [0017] 1. In the embodiments of the present application, priority classification is performed on all current base stations to obtain a current priority type of each base station based on base stations corresponding to respective docking tasks in a current batch docking task list and priority types of the docking tasks, and each base station is allocated with a frequency according to the current priority type thereof, thereby meeting different real-time requirements
10 of the customers for different task priorities.

[0018] 2. In the embodiments of the present application, a current weight degree of each base station is obtained based on a frequency interval weight between every two base stations in the current connectivity topological structure, then frequency allocation is performed for the current available frequency set based on the current weight degree of each base station and the
15 frequency interval weight, which not only prevents the problems of frequency use conflicts and mutual interferences between the base stations, but also maximizes the communication throughput of the base stations in limited frequency resources, improves the frequency utilization rate and reduces the time of issuance of the batch docking tasks.

[0019] 3. In the embodiments of the present application, each base station transmits a
20 corresponding docking task to an electronic shelf label based on a current allocated frequency, and then releases the current allocated frequency, so that during issuance of a next-round batch docking task list, each base station is dynamically re-allocated with a frequency based on the current available frequency set, thereby realizing dynamic frequency allocation for the base stations based on the change of the batch task list, and further solving the problems of frequency
25 use conflicts and mutual interferences between the base stations.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] For a clearer illustration of technical features in the embodiments of the present disclosure or the prior art, a brief description of the drawings for the embodiments or the prior
30 art will be given below. Obviously, the drawings described below involve only some embodiments of this disclosure. For those of ordinary skill in the art, other drawings can be derived from these drawings without any inventive efforts. In the drawings:

[0021] FIG. 1 illustrates a flowchart diagram of a dynamic frequency allocation method for a base station according to an embodiment of the present application;

[0022] FIG. 2 illustrates a structural diagram of a shelf label system according to an embodiment of the present application;

[0023] FIG. 3 illustrates a schematic diagram of a current connectivity topological structure according to an embodiment of the present application; and

5 [0024] FIG. 4 illustrates a specific flowchart diagram of step S104 in FIG. 1.

DETAILED DESCRIPTION

[0025] For a clearer illustration of the objectives, technical features and effects of the present application, a clear and complete description of the embodiments of the present application will be set forth with reference to the drawings. Obviously, the described
10 embodiments are only a part, rather than all, of the embodiments of the present application. All other embodiments derived by persons skilled in the art from the embodiments of the present application without making inventive efforts shall fall within the scope of the present application.

15 [0026] In a first aspect, the present application provides a dynamic frequency allocation method for a base station, which specifically includes the following embodiments.

[0027] FIG. 1 illustrates a flowchart diagram of a dynamic frequency allocation method for a base station according to an embodiment of the present application. As illustrated in FIG. 1, when being applied to a shelf label system that includes a server, base stations and an
20 electronic shelf label, the method specifically includes:

[0028] step S101: obtaining, based on ranging results among base stations in a store, a current connectivity topological structure of all the base stations.

[0029] It should be noted that, as illustrated in FIG. 2, in the embodiment, the shelf label system of each store includes a server, a plurality of base stations and a plurality of electronic
25 shelf labels, and the server is configured to transmit trigger information or a control instruction to the electronic shelf labels through the base stations.

[0030] In the embodiment, the server controls all the base stations in the store to transmit ranging signals in turn, and obtains ranging results between each base station and other base stations based on intensity of feedback signals transmitted from the other base stations to the
30 base station; the server then establishes a current connectivity topological structure of the base stations based on the ranging results among all the base stations. The current connectivity topological structure includes a frequency interval weight between two base stations, as illustrated in FIG. 3, where 0 to 9 in black circles represent a base station 0 to a base station 9, a frequency interval weight between the base station 0 and the base station 1 is 3, a frequency

interval weight between the base station 0 and the base station 5 is 1, and a frequency interval weight between the base station 0 and the base station 6 is 0 since they are not connected. It should be noted that in order to prevent any signal interference between the base stations, the frequency interval weight between two base stations increases as the distance between the two

5 base stations decreases.

[0031] step S102: obtaining a current weight degree of each base station based on a frequency interval weight between every two base stations in the current connectivity topological structure.

[0032] In the embodiment, a current base station is taken as a target node, all connected
10 base stations connected to the target node are obtained based on the current connectivity topological structure, and the frequency interval weights between the target node and all connected base stations are accumulated to obtain a current weight degree of the current base station.

[0033] Taking the base station 1 as an example, in the current connectivity topological
15 structure illustrated in FIG. 3, all the connected base stations connected to the base station 1 are the base station 0, the base station 6, the base station 2, the base station 8 and the base station 5 respectively. The frequency interval weights between the base station 1 and all the connected base stations are 3, 1, 1, 3, and 1 respectively, so the current weight of the base station 1 is: $3+1+1+3+1 = 9$. By analogy, the current weight degrees of the respective base stations
20 illustrated in FIG. 3 are given as follows in a descending order: 12 for the base station 5, 12 for the base station 7, 11 for the base station 4, 10 for the base station 8, 9 for the base station 1, 9 for the base station 3, 9 for the base station 9, 8 for the base station 0, 4 for the base station 2, and 4 for the base station 6.

[0034] In the embodiment, the larger the current weight degree of the base station, the
25 more or closer other base stations are connected to the base station, and the stronger the interference.

[0035] step S103: performing priority classification on all current base stations to obtain a current priority type of each base station based on base stations corresponding to respective docking tasks in a current batch docking task list and priority types of the docking tasks.

[0036] In the embodiment, the current batch docking task list includes the base station
30 corresponding to each docking task and the priority type of each docking task. The docking task includes, but is not limited to, a commodity binding task, a commodity attribute modification task, a lamp flashing task and a page switching task. The priority type includes, but is not limited to, high and low priorities.

[0037] It should be noted that in the embodiment, the priority type of each base station is the same as that of the corresponding docking task, i.e., when the docking task is of high priority, the corresponding base station is also of high priority. In FIG. 3, for example, the base stations with the priority type of high priority are the base station 0, the base station 1, the base station 2, and the base station 3, and the base stations with the priority type of low priority are the base station 4, the base station 5, the base station 6, the base station 7, the base station 8, and the base station 9.

[0038] step S104: obtaining a current allocated frequency of each base station based on the current priority type of the base station, the current weight degree of the base station, the frequency interval weight and a current available frequency set.

[0039] As illustrated in FIG. 4, in the embodiment, performing priority classification on all current base stations to obtain a current priority type of each base station based on base stations corresponding to respective docking tasks in a current batch docking task list and priority types of the docking tasks specifically includes:

[0040] step S201: taking a base station with the current priority type of high priority and having a maximum current weight degree among base stations without frequency allocation, as a current first target base station;

[0041] step S202: obtaining a plurality of first frequency-allocated base stations connected to the current first target base station based on the current first target base station;

[0042] step S203: selecting a first target frequency as a current allocated frequency of the current first target base station from the current available frequency set based on a plurality of first allocated frequencies corresponding to the plurality of first frequency-allocated base stations, where a difference between the first target frequency and each first allocated frequency is greater than or equal to the corresponding frequency interval weight;

[0043] step S204: determining whether frequency allocation for the base station with the current priority type of high priority has been completed, and if so, performing step S205, or if not, performing step S201;

[0044] step S205: taking a base station with the current priority type of low priority and having a maximum current weight degree among base stations without frequency allocation, as a current second target base station;

[0045] step S206: obtaining a plurality of second frequency-allocated base stations connected to the current second target base station based on the current second target base station;

[0046] step S207: selecting a second target frequency as a current allocated frequency of

the current second target base station from the current available frequency set based on a plurality of second allocated frequencies corresponding to the plurality of second frequency-allocated base stations; where a difference between the second target frequency and each second allocated frequency is greater than or equal to the corresponding frequency interval weight.

5 **[0047]** As can be seen from FIG. 3, in the embodiment,

if the available frequency set includes frequency 0, frequency 1, frequency 2, frequency 3, and frequency 4;

the base stations with the current priority type of high priority are the base station 0, the base station 1, the base station 2, and the base station 3;

10 the base stations with the current priority type of low priority are the base station 4, the base station 5, the base station 6, the base station 7, the base station 8, and the base station 9;

the current weight degrees of the base stations are given as follows in a descending order: 12 for the base station 5, 12 for the base station 7, 11 for the base station 4, 10 for the base station 8, 9 for the base station 1, 9 for the base station 3, 9 for the base station 9, 8 for the base station 0, 4 for the base station 2, and 4 for the base station 6.

[0048] It should be noted that firstly, frequency allocations are performed for four base stations with high priority according to the current priority types of the base stations, and the specific allocation steps are as follows:

[0049] 1) finding out the base station 1 with a maximum current weight degree among the four base stations with high priority, and taking the base station 1 as the current first target base station;

[0050] 2) since the current base station 1 is the first base station to be subjected to frequency allocation and there is no first frequency-allocated base station connected thereto, the base station 1 is allocated with frequency 0;

25 **[0051]** 3) continuing to find out the base station 3 with a maximum current weight degree among the remaining three base stations with high priority without frequency allocation, and taking the base station 3 as the current first target base station;

[0052] 4) as can be seen from FIG. 3, the base station 1 is not connected to the base station 3, so the base station 3 is also allocated with frequency 0;

30 **[0053]** 5) continuing to find out the base station 0 with a maximum current weight degree among the remaining two base stations with high priority and without frequency allocation, and taking the base station 0 as the current first target base station;

[0054] 6) as can be seen from FIG. 3, the frequency-allocated base stations connected to the base station 0 include the base station 1, and the frequency interval weight between the base

station 0 and the base station 1 is 3, then frequency 3 is selected from the available frequency set as the current allocated frequency of the base station 0, thereby satisfying a condition that a frequency difference between the base station 0 and the base station 1 is greater than or equal to a corresponding frequency interval weight;

5 **[0055]** 7) allocating a frequency to the last base station 2 with high priority. since the frequency-allocated base station connected to the base station 2 is the base station 1, and the frequency interval weight between the base station 1 and the base station 2 is 1, selecting any one of frequencies 1, 2 and 3 as the current allocated frequency of the base station 2 from the available frequency set. In this embodiment, frequency 1 is taken as an example.

10 **[0056]** Therefore, after the frequency allocations for the four base stations with high priority are completed according to the above steps, frequency allocations are sequentially performed for six base stations with low priority according to the above steps. Since the allocation principle is the same, the relevant description is omitted here.

15 **[0057]** step S105: transmitting, by each base station, a corresponding docking task to an electronic shelf label based on a current allocated frequency, and releasing, by each base station, the current allocated frequency, so that during issuance of a next-round batch docking task list, each base station is dynamically re-allocated with a frequency based on the current available frequency set.

20 **[0058]** It should be noted that after obtaining the current allocated frequency, each base station transmits relevant docking tasks based on the current allocated frequency, and thereafter releases the current allocated frequency, so that during transmission of a next round of batch docking tasks, each base station is re-allocated with a frequency, thereby realizing the dynamic frequency allocation for the base stations.

25 **[0059]** Compared with the prior art, this embodiment has the following advantageous effects:

30 **[0060]** 1. In the embodiments, priority classification is performed on all current base stations to obtain a current priority type of each base station based on base stations corresponding to respective docking tasks in a current batch docking task list and priority types of the docking tasks, and each base station is allocated with a frequency based on the current priority type thereof, thereby meeting different real-time requirements of the customers for different task priorities.

[0061] 2. In the embodiments, a current weight degree of each base station is obtained based on a frequency interval weight between every two base stations in the current connectivity topological structure, then frequency allocation is performed for the current available frequency

set based on the current weight degree of each base station and the frequency interval weight, which not only prevents the problems of frequency use conflicts and mutual interferences between the base stations, but also maximizes the communication throughput of the base stations in limited frequency resources, improves the frequency utilization rate and reduces the time of issuance of the batch docking tasks.

[0062] 3. In the embodiments, each base station transmits a corresponding docking task to an electronic shelf label based on a current allocated frequency, and then releases the current allocated frequency, so that during issuance of a next-round batch docking task list, each base station is re-allocated with a frequency based on the current available frequency set, thereby realizing dynamic frequency allocation for the base stations based on the change of the batch task list, and further solving the problems of frequency use conflicts and mutual interferences between the base stations.

[0063] In another embodiment of the present application, if the first target frequency or the second target frequency is not existed in the current available frequency set, a docking task corresponding to the current first target base station or the current second target base station is stored in a current unfinished task list; and a task integration is performed on the current unfinished task list and a next-round docking task list newly received to obtain a next-round batch docking task list.

[0064] It should be noted that there may be situations where frequencies cannot be allocated to the base stations with high priority and base stations with low priority. For example, when the base station 4 is taken as the current second target base station, the frequency-allocated base stations connected to the base station 4 are the base station 3 and the base station 0, the frequency interval weight between the base station 4 and the base station 3 is 3, the frequency interval weight between the base station 4 and the base station 0 is 1. However, the allocated frequency of the base station 0 is 3, and the allocated frequency of the base station 3 is 0. It is impossible to select, from frequencies 0, 1, 2 and 3 in the available frequency set, a frequency which has both a difference greater than or equal to 1 from the frequency of the base station 0, and a difference greater than or equal to 3 from the frequency of the base station 3, so the base station 4 cannot get a frequency in the current round of frequency allocation, and the docking task corresponding to the base station 4 also cannot be issued in the current round.

[0065] Further, a docking task corresponding to the current first target base station or the current second target base station without a successful frequency allocation in the current round is stored in the current unfinished task list, and a task integration is performed on the current unfinished task list and a next-round docking task list newly received, to obtain a next-round

batch docking task list which enables dynamic frequency allocation for the corresponding base stations according to the dynamic frequency allocation steps in the above embodiment.

[0066] In this embodiment, the task integration includes, but is not limited to, adjusting the priority type of each task in the current unfinished task list to high priority.

5 **[0067]** In another embodiment of the present application, the method further includes: scanning, by each base station in the store, each frequency point in a preset frequency set to obtain signal scanning power of each base station for each frequency point; comparing each signal scanning power with a preset threshold power, and forming the current available frequency set using the frequency points corresponding to the signal scanning power less than
10 the preset threshold power.

[0068] It should be noted that in the embodiment, the preset frequency set includes a plurality of frequencies allocated for the shelf label system of the store. A background server schedules each base station to scan each frequency in the preset frequency set; the base station feeds the signal power received at each frequency back to the background server; and the
15 background server selects, based on the signal power at each frequency fed back by each base station, the frequencies corresponding to the signal powers less than the preset threshold power to form an available frequency set.

[0069] In a second aspect, an embodiment of the present application provides a shelf label system, which specifically includes a server, base stations and an electronic shelf label. The
20 server is configured to obtain, based on ranging results among base stations in a store, a current connectivity topological structure of all the base stations. The server is further configured to obtain a current weight degree of each base station based on a frequency interval weight between every two base stations in the current connectivity topological structure. The server is further configured to perform priority classification on all current base stations to obtain a
25 current priority type of each base station based on base stations corresponding to respective docking tasks in a current batch docking task list and priority types of the docking tasks. The server is further configured to obtain a current allocated frequency of each base station based on the current priority type of the base station, the current weight degree of the base station, the frequency interval weight and a current available frequency set. Each base station is configured
30 to transmit a corresponding docking task to an electronic shelf label based on a current allocated frequency, and further configured to release the current allocated frequency after transmitting the corresponding docking task, so that during issuance of a next-round batch docking task list, each base station is dynamically re-allocated with a frequency based on the current available frequency set.

[0070] In a third aspect, an embodiment of the present application provides a computer device, including a memory, a processor and a computer program stored in the memory and executable on the processor. The processor is configured to execute the computer program to implement the steps of: obtaining, based on ranging results among base stations in a store, a
 5 current connectivity topological structure of all the base stations; obtaining a current weight degree of each base station based on a frequency interval weight between every two base stations in the current connectivity topological structure; performing priority classification on all current base stations to obtain a current priority type of each base station based on base stations corresponding to respective docking tasks in a current batch docking task list and
 10 priority types of the docking tasks; obtaining a current allocated frequency of each base station based on the current priority type of the base station, the current weight degree of the base station, the frequency interval weight and a current available frequency set; and transmitting, by each base station, a corresponding docking task to an electronic shelf label based on the current allocated frequency, and releasing, by each base station, the current allocated frequency,
 15 so that during issuance of a next-round batch docking task list, each base station is dynamically re-allocated with a frequency based on the current available frequency set.

[0071] Those of ordinary skills in the art can understand that all or part of the flows in the aforementioned method embodiments can be completed by instructing relevant hardware through a computer program that may be stored in a nonvolatile computer-readable storage
 20 medium, and when executed, the program can include the flows of the aforementioned method embodiments. In which, any reference to a memory, a storage, a database or any other medium adopted in the embodiments of the present application can include a non-volatile memory and/or a volatile memory. The nonvolatile memory may include a read-only memory (ROM), a programmable ROM (PROM), an electrically programmable ROM (EPROM), an electrically
 25 erasable programmable ROM (EEPROM) or a flash memory. The volatile memory may include a random-access memory (RAM) or an external cache memory. By way of illustration rather than limitation, the RAM is available in various forms, such as a static RAM (SRAM), a dynamic RAM (DRAM), a synchronous DRAM (SDRAM), a double data rate SDRAM (DDRSDRAM), an enhanced SDRAM (ESDRAM), a synch-link DRAM (SLDRAM), a
 30 memory bus (Rambus) direct RAM (RDRAM), a direct memory bus dynamic RAM (DRDRAM) and a memory bus dynamic RAM (RDRAM).

[0072] It should be noted that herein, the relational terms such as ‘first’ and ‘second’ are only used to distinguish one entity or operation from another entity or operation, and do not necessarily require or imply any such actual relationship or sequence between these entities or

operations. In addition, the term ‘comprise’, ‘include’ or any other variation thereof is intended to cover non-exclusive inclusions, so that a process, method, article or device that includes a series of elements includes not only those elements, but also other elements not explicitly listed, or further includes elements inherent to such process, method, article or device. Without further
5 restrictions, an element defined by a statement ‘comprising a ...’ does not exclude the existence of other identical elements in a process, method, article or device that includes said element.

CLAIMS

What is claimed is:

1. A dynamic frequency allocation method for a base station, wherein the method is applicable to a shelf label system and comprises:

5 obtaining, based on ranging results among base stations in a store, a current connectivity topological structure of all the base stations;

obtaining a current weight degree of each base station based on a frequency interval weight between every two base stations in the current connectivity topological structure;

10 performing priority classification on all current base stations to obtain a current priority type of each base station based on base stations corresponding to respective docking tasks in a current batch docking task list and priority types of the docking tasks;

obtaining a current allocated frequency of each base station based on the current priority type of the base station, the current weight degree of the base station, the frequency interval weight and a current available frequency set; and

15 transmitting, by each base station, a corresponding docking task to an electronic shelf label based on the current allocated frequency, and releasing, by each base station, the current allocated frequency, so that during issuance of a next-round batch docking task list, each base station is dynamically re-allocated with a frequency based on the current available frequency set.

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2. The method according to claim 1, wherein obtaining the current allocated frequency of each base station based on the current priority type of the base station, the current weight degree of the base station, the frequency interval weight and the current available frequency set comprises:

25 taking the base station with the current priority type of high priority and having a maximum current weight degree among base stations without frequency allocation, as a current first target base station;

obtaining a plurality of first frequency-allocated base stations connected to the current first target base station based on the current first target base station; and

30 selecting a first target frequency as a current allocated frequency of the current first target base station from the current available frequency set based on a plurality of first allocated frequencies corresponding to the plurality of first frequency-allocated base stations, wherein a difference between the first target frequency and each first allocated frequency is greater than or equal to the corresponding frequency interval weight.

3. The method according to claim 2, wherein obtaining the current allocated frequency of each base station based on the current priority type of the base station, the current weight degree of the base station, the frequency interval weight and the current available frequency set further

5 comprises:

taking the base station with the current priority type of low priority and having a maximum current weight degree among base stations without frequency allocation, as a current second target base station, after frequency allocation for the base station with the current priority type of high priority is completed;

10 obtaining a plurality of second frequency-allocated base stations connected to the current second target base station based on the current second target base station; and

selecting a second target frequency as a current allocated frequency of the current second target base station from the current available frequency set based on a plurality of second allocated frequencies corresponding to the plurality of second frequency-allocated base stations, wherein a difference between the second target frequency and each second allocated frequency is greater than or equal to the corresponding frequency interval weight.

4. The method according to claim 3, further comprising:

storing the docking task corresponding to the current first target base station or the current second target base station in a current unfinished task list, if the first target frequency or the second target frequency is not existed in the current available frequency set; and

performing a task integration on the current unfinished task list and a next-round docking task list newly received to obtain the next-round batch docking task list.

25 5. The method according to claim 4, wherein the task integration comprises adjusting the priority type of each task in the current unfinished task list to high priority.

6. The method according to claim 1, further comprising:

scanning, by each base station in the store, each frequency point in a preset frequency set to obtain signal scanning power of each base station for each frequency point; and

comparing each signal scanning power with a preset threshold power, and forming the current available frequency set using the frequency points corresponding to the signal scanning power less than the preset threshold power.

7. The method according to claim 1, wherein obtaining, based on ranging results among base stations in the store, the current connectivity topological structure of all the base stations comprises:

controlling all the base stations in the store to transmit ranging signals in turn;

5 obtaining the ranging results between each base station and other base stations based on intensity of feedback signals transmitted from the other base stations to the base station; and

establishing the current connectivity topological structure of the base stations based on the ranging results among all the base stations.

10 8. The method according to claim 1, wherein obtaining the current weight degree of each base station based on the frequency interval weight between every two base stations in the current connectivity topological structure comprises:

taking a current base station as a target node, and obtaining all connected base stations connected to the target node based on the current connectivity topological structure; and

15 accumulating the frequency interval weights between the target node and all connected base stations to obtain a current weight degree of the current base station.

9. A shelf label system, comprising a server, base stations and an electronic shelf label, wherein

20 the server is configured to obtain, based on ranging results among base stations in a store, a current connectivity topological structure of all the base stations;

the server is further configured to obtain a current weight degree of each base station based on a frequency interval weight between every two base stations in the current connectivity topological structure;

25 the server is further configured to perform priority classification on all current base stations to obtain a current priority type of each base station based on base stations corresponding to respective docking tasks in a current batch docking task list and priority types of the docking tasks;

the server is further configured to obtain a current allocated frequency of each base station
30 based on the current priority type of the base station, the current weight degree of the base station, the frequency interval weight and a current available frequency set; and

each base station is configured to transmit a corresponding docking task to an electronic shelf label based on the current allocated frequency, and to release the current allocated frequency after transmitting the corresponding docking task, so that during issuance of a next-

round batch docking task list, each base station is dynamically re-allocated with a frequency based on the current available frequency set.

10. A computer device, comprising a memory, a processor and a computer program stored
5 in the memory and executable on the processor, wherein the processor is configured to execute the computer program to implement the steps of the method according to any one of claims 1 to 8.