CABINET SERVER AND DATA CENTER BASED ON CABINET SERVER

TECHNICAL FIELD

[0001] The present invention relates to a network architecture, and in particular, to a cabinet server and a data center based on the cabinet server.

BACKGROUND

[0002] A data center generally refers to a system that implements functions such as data centralized processing, data exchange, and data management within physical space. With development of technologies and advancement of the society, more data is generated, and a data center is increasingly important.

[0003] From a perspective of hardware composition, existing data centers generally include two types, that is, a wired data center and a wireless data center. The wired data center includes multiple cabinet servers centered on data processing and cables connecting components within the cabinet servers. As a communication passage between the cabinet servers and between the components within the cabinet servers, the cables are generally relatively large in quantity. The wired data center has problems of a bad maintainability and a bad fault-tolerance capability due to the large quantity of cables. In addition, scattered cables block a ventilation channel and cause bad heat sink performance. To resolve the problems, the wireless data center is widely applied. Because the wireless data center performs communication in a wireless manner, the foregoing problems of the wired data center can be well resolved.

[0004] However, the inventor finds in the study process of this application that, in the prior art, a radio signal is generally horizontally transmitted while a radio signal transmission is performed in a wireless data center, and electromagnetic radiation generated by the radio signal causes electromagnetic interference to electronic devices in the wireless data center, and affects service lives of the electronic devices and transmission quality of the radio signal.

SUMMARY

[0005] The present invention~~Embodiments of this application~~ discloses a cabinet server and a data center based on the

cabinet server, so as to resolve a problem in the prior art that when a wireless data center performs communication, generated radiation affects a service life of an electronic device and transmission quality of a radio signal.

[0006] To resolve the foregoing technical problem, the present inventionthe embodiments of this application discloses the following technical solutions:

[0007] According to a first aspect, a cabinet server is provided, where the cabinet server includes at least two function nodes, multiple intra-cabinet antennas, and multiple inter-cabinet antennas, where

the function nodes are vertically arranged, to form a server core, where the server core includes multiple function node layers, and each function node layer includes at least one function node;

the intra-cabinet antennas are vertically arranged and are disposed at a side of the server core, an intra-cabinet antenna corresponding to each function node has a frequency needed by the corresponding function node, the intra-cabinet antenna and the corresponding function node are electrically connected, and adjacent intra-cabinet antennas are wirelessly connected; and

when a radio signal is transmitted within the cabinet server, each intra-cabinet antenna is configured to transmit, after receiving the radio signal, the radio signal to a vertically adjacent intra-cabinet antenna, until the radio signal is transmitted to a target intra-cabinet antenna of the multiple intra-cabinet antennas, and the target intra-cabinet antenna transmits the radio signal to a function node that is electrically connected to the target intra-cabinet antenna, so that the function node analyzes and processes the radio signal.

[0008] With reference to the first aspect, in a first possible implementation manner of the first aspect, the cabinet server further includes a wireless data controller, and the wireless data controller is disposed outside the server core and is connected to an intra-cabinet antenna disposed at a top layer and an inter-cabinet antenna;

each inter-cabinet antenna is disposed at a top of the server core;

when the radio signal is transmitted between the cabinet server and another cabinet server, after obtaining the radio signal, the intra-cabinet antenna disposed at the top layer transmits the radio signal to the wireless data controller, and the wireless data controller transmits the radio signal to the connected inter-cabinet antenna; and

the inter-cabinet antenna is configured to receive the radio signal transmitted by the wireless data controller and transmit the radio signal to the another cabinet server; and receive a radio signal transmitted by another cabinet server, and transmit, to the wireless data controller connected to the inter-cabinet antenna, the radio signal transmitted by the another cabinet server, so

that the wireless data controller transmits, to the intra-cabinet antenna at the top layer, the radio signal transmitted by the another cabinet server.

[0009] With reference to the first aspect, in a second possible implementation manner of the first aspect, the cabinet server further includes:

a wireless shield layer, where the wireless shield layer wraps the outside of the server core; and

the intra-cabinet antennas, the inter-cabinet antennas, and the wireless data controller are disposed outside the wireless shield layer.

[0010] With reference to the first aspect, in a third possible implementation manner of the first aspect, the cabinet server further includes:

an antenna backplane, where the antenna backplane is disposed outside the wireless shield layer and configured to fasten the intra-cabinet antenna.

[0011] With reference to the first aspect, in a fourth possible implementation manner of the first aspect, the cabinet server further includes: ~~the cabinet server further includes:~~

an extension plate, where the extension plate is disposed outside the wireless shield layer, is disposed in parallel with the function nodes, and is configured to fasten the intra-cabinet antenna.

[0012] With reference to the first aspect, or the first possible implementation manner of the first aspect, or the second possible implementation manner of the first aspect, or the third possible implementation manner of the first aspect, or the fourth possible implementation manner of the first aspect, in a fifth possible implementation manner of the first aspect, a hollow cavity is formed between adjacent function nodes.

[0013] With reference to the first aspect, in a sixth possible implementation manner of the first aspect, the function nodes include:

a computing node, a memory node, a storage node, and an input/output node.

[0014] With reference to the first possible implementation manner of the first aspect, in a seventh possible implementation manner of the first aspect, the cabinet server further includes:

a bottom inter-cabinet antenna disposed at a bottom of the server core; and

a bottom wireless data controller that is disposed at the bottom of the server core and that is connected to the bottom inter-cabinet antenna, where the bottom wireless data controller is connected to a function node at a bottom layer; and

the bottom wireless data controller is configured to: after receiving a radio signal transmitted by the function node at the bottom layer, transmit the radio signal to the bottom inter-cabinet antenna, so that the bottom inter-cabinet antenna transmit the radio signal to another cabinet server; and after receiving a radio signal transmitted by the bottom inter-cabinet antenna,

transmit the radio signal to the bottom inter-cabinet antenna.

[0015] With reference the first possible implementation manner of the first aspect, or the second possible implementation manner of the first aspect, or the third possible implementation manner of the first aspect, or the fourth possible implementation manner of the first aspect, or the fifth possible implementation manner of the first aspect, or the sixth possible implementation manner of the first aspect, or the seventh possible implementation manner of the first aspect, in an eighth possible implementation manner of the first aspect, the cabinet server further includes:

rack top antennas disposed above the intra-cabinet antenna disposed at the top layer, where the rack top antennas and the intra-cabinet antennas are vertically arranged, the rack top antennas and the intra-cabinet antennas at the top layer are wirelessly connected, and the rack top antennas and the wireless data controller are connected; and

the rack top antenna is configured to receive a radio signal transmitted by the intra-cabinet antenna at the top layer and transmit the radio signal to the wireless data controller; and receive a radio signal transmitted by the wireless data controller and then transmit the radio signal to the intra-cabinet antenna at the top layer.

[0016] According to a second aspect, a data center is provided, where the data center includes:

the cabinet server according to the first aspect.

[0017] With reference to the second aspect, in a first possible implementation manner of the second aspect,

in the data center, adjacent cabinet servers are wirelessly connected by using an inter-cabinet antenna.

[0018] The present invention~~Embodiments of this application~~ discloses a cabinet server and a data center based on the cabinet server. The cabinet server includes at least two function nodes, multiple intra-cabinet antennas, and multiple inter-cabinet antennas. The function nodes are vertically arranged, to form a server core, where the server core includes multiple function node layers, and each function node layer includes at least one function node. The intra-cabinet antennas are vertically arranged, disposed at a side of the server core, and electrically connected to corresponding function nodes, and adjacent intra-cabinet antennas are wirelessly connected.

[0019] When a radio signal is transmitted within a cabinet by using the cabinet server disclosed in the present invention~~an embodiment of the present invention~~, after receiving a radio signal, an intra-cabinet antenna in the cabinet server transmits the radio signal to a vertically adjacent intra-cabinet antenna, so as to implement transmission of the radio signal between adjacent intra-cabinet antennas. A transmission path of the radio signal is formed of vertically arranged intra-cabinet antennas. Because intra-cabinet antennas are disposed at a side of a server core formed of function nodes,

embodiment focuses on a difference from other embodiments. Especially, a system embodiment is basically similar to a method embodiment, and therefore is described briefly; for related parts, reference may be made to partial descriptions in the method embodiment.

[0094] It should be noted that in this specification, relational terms such as first and second are only used to distinguish one entity or operation from another, and do not necessarily require or imply that any actual relationship or sequence exists between these entities or operations. Moreover, the terms "include", "include", or their any other variant is intended to cover a non-exclusive inclusion, so that a process, a method, an article, or an apparatus that includes a list of elements not only includes those elements but also includes other elements which are not expressly listed, or further includes elements inherent to such process, method, article, or apparatus. An element preceded by "includes a ..." does not, without more constraints, preclude the existence of additional identical elements in the process, method, article, or apparatus that includes the element.

[0095] The foregoing descriptions are merely specific implementation manners of the present invention. It should be noted that a person of ordinary skill in the art may make several improvements or polishing without departing from the principle of the present invention and the improvements or polishing shall fall within the protection scope of the present invention.

[0096] The foregoing descriptions are implementation manners of the present invention, but are not intended to limit the protection scope of the present invention. Any modification, equivalent replacement, and improvement made without departing from the ~~spirit and~~ principle of the present invention shall fall within the protection scope of the present invention.

CLAIMS

What is claimed is:

1. A cabinet server, wherein the cabinet server comprises at least two function nodes, multiple intra-cabinet antennas, and multiple inter-cabinet antennas, wherein

the function nodes are vertically arranged, to form a server core, wherein the server core comprises multiple function node layers, and each function node layer comprises at least one function node;

the intra-cabinet antennas are vertically arranged and are disposed at a side of the server core, an intra-cabinet antenna corresponding to each function node has a frequency needed by the corresponding function node, the intra-cabinet antenna and the corresponding function node are electrically connected, and adjacent intra-cabinet antennas are wirelessly connected; and

when a radio signal is transmitted within the cabinet server, each intra-cabinet antenna is configured to transmit, after receiving the radio signal, the radio signal to a vertically adjacent intra-cabinet antenna, until the radio signal is transmitted to a target intra-cabinet antenna of the multiple intra-cabinet antennas, and the target intra-cabinet antenna transmits the radio signal to a function node that is electrically connected to the target intra-cabinet antenna, so that the function node analyzes and processes the radio signal.

2. The cabinet server according to claim 1, wherein the cabinet server further comprises a wireless data controller, and the wireless data controller is disposed outside the server core and is connected to an intra-cabinet antenna disposed at a top layer and an inter-cabinet antenna;

each inter-cabinet antenna is disposed at a top of the server core;

when the radio signal is transmitted between the cabinet server and another cabinet server, after obtaining the radio signal, the intra-cabinet antenna disposed at the top layer transmits the radio signal to the wireless data controller, and the wireless data controller transmits the radio signal to the connected inter-cabinet antenna; and

the inter-cabinet antenna is configured to receive the radio signal transmitted by the wireless data controller and transmit the radio signal to the another cabinet server; and receive a radio signal transmitted by another cabinet server, and transmit, to the wireless data controller connected to the inter-cabinet antenna, the radio signal transmitted by the another cabinet server, so that the wireless data controller transmits, to the intra-cabinet antenna at the top layer, the radio signal transmitted by the another cabinet server.

3. The cabinet server according to claim 1, wherein the cabinet server further comprises:

a wireless shield layer, wherein the wireless shield layer wraps the outside of the server core;

and

the intra-cabinet antennas, the inter-cabinet antennas, and the wireless data controller are disposed outside the wireless shield layer.

4. The cabinet server according to claim 1, wherein the cabinet server further comprises:

an antenna backplane, wherein the antenna backplane is disposed outside the wireless shield layer and configured to fasten the intra-cabinet antenna.

5. The cabinet server according to claim 1, wherein the cabinet server further comprises:

an extension plate, wherein the extension plate is disposed outside the wireless shield layer, is disposed in parallel with the function nodes, and is configured to fasten the intra-cabinet antenna.

6. The cabinet server according to any one of claims 1 to 5, wherein

a hollow cavity is formed between adjacent function nodes.

7. The cabinet server according to claim 1, wherein the function nodes comprise:

a computing node, a memory node, a storage node, and an input/output node.

8. The cabinet server according to claim 2, wherein the cabinet server further comprises:

a bottom inter-cabinet antenna disposed at a bottom of the server core; and

a bottom wireless data controller that is disposed at the bottom of the server core and that is connected to the bottom inter-cabinet antenna, wherein the bottom wireless data controller is connected to a function node at a bottom layer; and

the bottom wireless data controller is configured to: after receiving a radio signal transmitted by the function node at the bottom layer, transmit the radio signal to the bottom inter-cabinet antenna, so that the bottom inter-cabinet antenna transmit the radio signal to another cabinet server; and after receiving a radio signal transmitted by the bottom inter-cabinet antenna, transmit the radio signal to the bottom inter-cabinet antenna.

9. The cabinet server according to any one of claims 2 to 8, wherein the cabinet server further comprises:

rack top antennas disposed above the intra-cabinet antenna disposed at the top layer, wherein the rack top antennas and the intra-cabinet antennas are vertically arranged, the rack top antennas and the intra-cabinet antennas at the top layer are wirelessly connected, and the rack top antennas and the wireless data controller are connected; and

the rack top antenna is configured to receive a radio signal transmitted by the intra-cabinet antenna at the top layer and transmit the radio signal to the wireless data controller; and receive a radio signal transmitted by the wireless data controller and then transmit the radio signal to the intra-cabinet antenna at the top layer.

10. A data center, wherein the data center comprises:

the cabinet server according to any one of claims 1 to 9.

11. The data center according to claim 10, wherein

in the data center, adjacent cabinet servers are wirelessly connected by using an inter-cabinet antenna.

CLAIMS

1. A cabinet server, wherein the cabinet server comprises at least two function nodes (100), multiple intra-cabinet antennas (200), and multiple inter-cabinet antennas (300), wherein

the function nodes (100) are vertically arranged, to form a server core, wherein the server core comprises multiple function node layers, and each function node layer comprises at least one function node (100);

the intra-cabinet antennas (200) are vertically arranged and are disposed at a side of the server core, an intra-cabinet antenna (200) corresponding to each function node (100) has a frequency needed by the corresponding function node (100), the intra-cabinet antenna (200) and the corresponding function node (100) are electrically connected, and adjacent intra-cabinet antennas (200) are wirelessly connected; and

when a radio signal is transmitted within the cabinet server, each intra-cabinet antenna (200) is configured to transmit, after receiving the radio signal, the radio signal to a vertically adjacent intra-cabinet antenna (200), until the radio signal is transmitted to a target intra-cabinet antenna (200) of the multiple intra-cabinet antennas (200), and the target intra-cabinet antenna (200) transmits the radio signal to a function node (100) that is electrically connected to the target intra-cabinet antenna (200), so that the function node (100) analyzes and processes the radio signal.

2. The cabinet server according to claim 1, wherein the cabinet server further comprises a wireless data controller (400), and the wireless data controller (400) is disposed outside the server core and is connected to an intra-cabinet antenna (200) disposed at a top layer and an inter-cabinet antenna (300);

each inter-cabinet antenna (300) is disposed at a top of the server core;

when the radio signal is transmitted between the cabinet server and another cabinet server, after obtaining the radio signal, the intra-cabinet antenna (200) disposed at the top layer transmits the radio signal to the wireless data controller (400), and the wireless data controller (400) transmits the radio signal to the connected inter-cabinet antenna (300); and

the inter-cabinet antenna (300) is configured to receive the radio signal transmitted by the wireless data controller (400) and transmit the radio signal to the another cabinet server; and receive a radio signal transmitted by another cabinet server, and transmit, to the wireless data controller (400) connected to the inter-cabinet antenna (300), the radio signal transmitted by the another cabinet server, so that the wireless data controller (400) transmits, to the intra-cabinet antenna (200) at the top layer, the radio signal transmitted by the another cabinet server.

3. The cabinet server according to claim 2, wherein the cabinet server further comprises:

a wireless shield layer (500), wherein the wireless shield layer wraps the outside of the server core; and

the intra-cabinet antennas (200), the inter-cabinet antennas (300), and the wireless data controller (400) are disposed outside the wireless shield layer (500).

4. The cabinet server according to claim 3, wherein the cabinet server further comprises:

an antenna backplane (600), wherein the antenna backplane (600) is disposed outside the wireless shield layer (500) and configured to fasten the intra-cabinet antenna (200).

5. The cabinet server according to claim 3, wherein the cabinet server further comprises:

an extension plate, wherein the extension plate is disposed outside the wireless shield layer (500), is disposed in parallel with the function nodes (100), and is configured to fasten the intra-cabinet antenna (200).

6. The cabinet server according to any one of claims 1 to 5, wherein

a hollow cavity (700) is formed between adjacent function nodes (100).

7. The cabinet server according to claim 1, wherein the function nodes (100) comprise:

a computing node, a memory node, a storage node, and an input/output node.

8. The cabinet server according to claim 2, wherein the cabinet server further comprises:

a bottom inter-cabinet antenna disposed at a bottom of the server core; and

a bottom wireless data controller that is disposed at the bottom of the server core and that is connected to the bottom inter-cabinet antenna, wherein the bottom wireless data controller is connected to a function node at a bottom layer; and

the bottom wireless data controller is configured to: after receiving a radio signal transmitted by the function node at the bottom layer, transmit the radio signal to the bottom inter-cabinet antenna, so that the bottom inter-cabinet antenna transmit the radio signal to another cabinet server; and after receiving a radio signal transmitted by the bottom inter-cabinet antenna, transmit the radio signal to the function node at the bottom layer.

9. The cabinet server according to any one of claims 2 to 8, wherein the cabinet server further comprises:

rack top antennas (110) disposed above the intra-cabinet antenna (200) disposed at the top layer, wherein the rack top antennas (110) and the intra-cabinet antennas (200) are vertically arranged, the rack top antennas (110) and the intra-cabinet antennas (200) at the top layer are wirelessly connected, and the rack top antennas (110) and the wireless data controller (400) are connected; and

the rack top antenna (110) is configured to receive a radio signal transmitted by the intra-cabinet antenna (200) at the top layer and transmit the radio signal to the wireless data

controller (400); and receive a radio signal transmitted by the wireless data controller (400) and then transmit the radio signal to the intra-cabinet antenna (200) at the top layer.

10. A data center, wherein the data center comprises:

the cabinet server according to any one of claims 1 to 9.

11. The data center according to claim 10, wherein

in the data center, adjacent cabinet servers are wirelessly connected by using an inter-cabinet antenna (300).