Talking about the Management and Analysis of Intelligent Wiring in Data Center

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Abstract. For the application scenario of data center, the wiring management problem of data center equipment room is effectively solved through four purposes: visual wiring operation display, intelligent wiring selection construction scheme, automatic calculation of jumper length, and topology deduction of wiring link integrity. Eliminate the traditional operation and maintenance excel wiring ledger management method, eliminate the management pain points such as complicated wiring management, huge number of wiring, and inconsistent wiring ledger. In a visual way, make the wiring management intelligent, regular and efficient in a visual way. Select the start port and end port of the wiring, intelligently calculate all the connection paths of the wiring, and intelligently select the best wiring path for operation and maintenance personnel for reference. At present, the calculation method of the best path is the minimum number of device nodes. The jumper length of the route selected by the user is calculated automatically, and the wiring distance is calculated to facilitate the operation and maintenance personnel to select the suitable wiring length for construction. Support operation and maintenance personnel to quickly import construction information to generate construction orders. The intelligent wiring module supports the display and topology deduction verification of the global wiring in the equipment room, so as to check the integrity of the connection information of the upstream and downstream physical wiring of the current equipment in the form of topology, and supports the functions of hiding the distribution frame, changing the topology shape and saving. It makes the operation and maintenance personnel's management of wiring in the equipment room simple and intuitive. The human-computer interaction mode can visually check the status of the equipment port occupation and all the device relationship sets passed by the entire wiring link.

1. Introduction
With the IT information age and the rush of big data, the number of all kinds of IT equipment in the equipment room of the data center has increased dramatically, supporting the maintenance of the smooth operation of various online businesses. The workload and difficulty of operation and maintenance personnel in the equipment room are increasing day by day. How to reduce the cost input of operation and maintenance personnel and improve the efficiency of operation and maintenance management has become a common problem facing enterprise data centers. Obviously, the traditional operation and
maintenance methods can no longer meet the current management needs. In addition to increasing personnel input, there is no good way to improve the current status quo. However, increasing personnel input also involves a series of problems in the management of collaborative work of personnel, the way of thinking about one thing and losing the other is doomed to fail to solve the problem in essence. Now the concept of visual intelligent wiring is introduced, and a variety of plans are planned for the daily work of operation and maintenance personnel through intelligent visualization. Use scientific and technological means to solve the difficulties in the operation and maintenance work, and invest more operation and maintenance human resources into online business support to maintain stability.

2. Thinking Analysis

2.1. Problem analysis
At present, the management of wiring in enterprise data center stays in manual records and excel spreadsheet management. Normally, only by making labels can the equipment and cable ends be unified and standardized, and the technical drawings can be traced according to the drawings to complete the routine maintenance inspection and troubleshooting [1]. The management method of abstract data is not convenient for users to directly view and use, and after multiple personnel wiring operations in the computer room, it is easy to appear that the wiring account is not updated in time, and the account information is not uniform. Statistical data from third-party organizations (Sun Microsystems / Gartner) on the causes of network downtime, the conclusion is that 72% of the root causes of network downtime are related to infrastructure, of which 72%, hardware equipment causes account for 10%, software causes 18%, and the remaining 71% is caused by network cabling [2]. For newly built data centers, the end-to-end management and information recording of wiring can be carried out through the installation and deployment of intelligent electronic distribution frame in the equipment room. However, for the long-running data center production environment, the way of mass transformation will seriously affect the security and stability of online business. Therefore, the old data center needs to improve the effective way of wiring management, which is difficult and has many management problems. It still needs to be improved in management methods. The scientific and technological methods are used to replace the traditional form account management method. For each wiring in the data center, it can be viewed, tracked and managed.

2.2. Construction ideas
Based on excel electronic ledger of the data center computer room wiring as the basic data, it is transformed into visual intelligent wiring for management. The schematic diagram of the master plan is as follows:

![Figure 1. The existing wiring excel ledger of the customer operation.](image-url)
As shown in Figure 1, the existing wiring excel ledger of the customer operation and maintenance personnel is first sorted out and added to the intelligent wiring platform as the basic information. Arrange the professional staffs to sort out the wiring that has not been entered in the ledger by manually touching the wire on the spot and record it in the intelligent wiring platform. In the process of wiring combing, check and verify the labels attached to wiring, reprint and paste the missing wiring labels, so as to ensure that each wiring can accurately check the device port information at both ends of starting and ending through the labels in the machine room. Manageability and scalability are very important for data center wiring management, ensuring reliable connection of active equipment, flexible configuration, effective management, easy testing, easy fault query, meeting long-term expansion and keeping cable is always in a manageable state [3]. Through the four main functions of intelligent wiring: visual display of wiring, intelligent selection of wiring paths, automatic calculation of jumper length and automatic verification of topology deduction, the goal of unified standardized management of data center wiring is achieved.

3. Strategy content

3.1. Wiring excel ledger
The data center operation and maintenance personnel organize the excel ledger that provides the wiring of the equipment room, which mainly consists of two parts: jumper and basic wiring. Manage according to the import format of the intelligent wiring platform, and import to manage. The imported wiring data is used as the basic supporting data of the platform, and the subsequent on-site wiring operations or changes can be updated in the intelligent wiring platform. The wiring that has been imported and managed can be used to view the wiring path and equipment node information through the visual display function of the wiring. It is convenient for operation and maintenance personnel to intuitively understand and master the distribution and connection status of the specified equipment wiring without entering the equipment room.

Professional wiring carding personnel sort out the unrecorded wiring in the wiring excel ledger by manually touching the wire and record it in the intelligent wiring platform for management. Professionals carefully organize the intricate wiring in the cabinet and bundle it with cable ties according to the wiring management specifications of the equipment room, so as to prevent the wiring from falling down from the equipment port due to too loose wiring. Because the on-site wiring and combing work in the equipment room is a high-risk operation, on the premise that the grooming personnel are careful and cautious in their work, they also need customers to do online business risk assessments, and migrate core business from operating devices in advance.

3.2. Wiring label verification
After the field wiring of the equipment room is input into the intelligent wiring platform, it is necessary to replace the unlabeled and wrong label information on the field wiring in accordance with the system data. Ensure that the management of on-site wiring in the equipment room is standardized and standardized, so that on-site construction personnel can obtain first-hand accurate wiring information. After the deployment of the intelligent wiring platform is completed, the construction room personnel of the equipment room will update the wiring label information in time after the on-site wiring operation, and the wiring ledger information shall also be updated in the intelligent wiring platform. So that the field wiring information and the intelligent wiring platform completely corresponds to each other, machine room wiring management problems readily solved.

3.3. Intelligent wiring
Use the intelligent wiring platform as the data center equipment room wiring management method, which can add, edit, delete and other operations on the connecting link and link node; It supports the management of physical properties of link node devices, such as the location of information points, port number connected to the distribution rack in the management room, port number of devices connected
by this cable (such as switches), etc. [4]. You can plan the wiring construction in advance by intelligently selecting the best path, and select the equipment ports at the start and end according to user needs. The system will plan the construction path according to the current distribution environment of the equipment room. According to the algorithm of the minimum number of nodes, the optimal wiring construction path is recommended from multiple construction schemes, and the construction sheet is output to the staff, so as to facilitate the construction on the site. Through the automatic calculation function of the jumper length, the construction wiring length is estimated, which is convenient for the construction personnel to select materials according to the wiring length, which greatly saves the waste of wiring materials and also brings great convenience to on-site work. Through the automatic verification function of topology deduction, the integrity of the physical wiring connection of the current device can be verified to detect whether it is a closed-loop path and whether there is no connection at one end of the wiring. Through the four function points of intelligent wiring, it can efficiently serve the daily work of operation and maintenance personnel, effectively solve the shortcomings that can only manage wiring through abstract data such as wiring excel ledger.

4. Conclusion
Through intelligent wiring technology, it effectively avoids the single and inefficient short board of traditional wiring management methods, and solves the status quo of difficult wiring records and many management problems. Make the wiring work efficiency of the rear data center machine room double with half the effort and effectively improve. It is hoped that more data centers can adopt the thinking mode of intelligent wiring to manage the wiring in the equipment room, which will facilitate the work of operation and maintenance personnel, and contribute to the intelligent management and technological construction of the data center.

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