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Retraction

Retracted: Optical Hybrid Network Structure Based on Cloud Computing and Big Data Technology

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] H. Wei, "Optical Hybrid Network Structure Based on Cloud Computing and Big Data Technology," *Journal of Sensors*, vol. 2022, Article ID 3936876, 6 pages, 2022.

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Research Article

Optical Hybrid Network Structure Based on Cloud Computing and Big Data Technology

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In order to meet the communication requirements of photoelectric hybrid network architecture, a research based on cloud computing and big data technology is proposed. The main content of this study is based on the analysis of cloud computing and big data technology, through the study of technical characteristics, using topological optical link with bypass data structure and other methods, and finally through experiments and analysis to build the research means of cloud computing and big data technology. The experimental results show that the weights of optical links are 60, 50 and 20, respectively. When the weights of optical links become smaller, node B reaches the paths of the six destination nodes. More paths can be transmitted through optical links, and the size of the range of nearby links can be controlled, which is feasible for the photoelectric hybrid network structure. *Conclusion*: The research based on cloud computing and big data technology can meet the needs of photoelectric hybrid network structure in communication.

1. Introduction

Photoelectric hybrid network communication is a major technical support for the networking of the Internet of Things at present. The networking technology of photoelectric hybrid communication has been developed quite well [1]. Photoelectric hybrid refers to the use of optical fiber, and wire as signal transmission tools, mixed information transmission through this way of information, often has relatively high accuracy, and the efficiency of information transmission will become very fast. This is a great fit for the networking technology of the Internet of Things, which is to use all kinds of useful information to coordinate all kinds of things, and this technology is often used in the delivery industry, retail industry, and other industries that have large warehouses. Through the application of the Internet of Things technology, the deployment of all kinds of products will become very convenient. In the past, the Internet of Things was built only by electrical signals, not optical fiber and optical signals. Now, after the development of photoelectric hybrid communication Internet of things networking technology, the current Internet of things networking can effectively apply photoelectric hybrid communication technology.

The advantages of photoelectric hybrid network lie in the high efficiency and accuracy of signal transmission. The Internet of Things networking technology of photoelectric hybrid communication uses both optical signals and electrical signals to transmit information, which is naturally more efficient than the single application of a certain signal [2]. In addition, due to mixed communication, when a certain signal transmission medium fails, another signal transmission mode can replace it well, thus having the opportunity to troubleshoot the other medium without affecting the normal use of the Internet of Things. In order to give full play to the great advantages of photoelectric hybrid communication technology, these two aspects should be the starting point and the technical professionalism should be improved. Although this kind of technology has great advantages, but because of the relatively high threshold for the application of this kind of technology, many of the Internet of Things that have been applied this kind of technology can not meet the actual needs of professional use. Therefore, we need to further improve the professionalism.

In the application process of photoelectric hybrid network, there are several technical points that must be solved. At present, the construction of optical fiber and the construction of the Internet of things are two key points [3].The reason why the Internet of Things networking technology of photoelectric hybrid communication is more effective is that it applies optical fiber to transmit information, while the construction of the Internet of Things is another difficult problem. Therefore, relevant personnel should focus on these two technical points to carry out the application of the Internet of Things networking technology of photoelectric hybrid communication, as shown in Figure 1.

2. Literature Review

In the current social development, in order to give full play to the advantages of photoelectric hybrid communication Internet of Things networking technology, it is necessary to improve the professionalism of this technology as much as possible. Firstly, a detailed analysis of user needs is conducted to optimize the photoelectric hybrid communication Internet of Things networking technology, so as to build a more professional Internet of things platform [4]. The Internet of Things required by Internet sales and entities is essentially the same, but surely there are some details that require more specialized technical means to ensure its actual effectiveness. Therefore, a professional Internet of Things platform should be established according to the needs of different industries. A professional Internet of Things platform can undertake more information transfer tasks and provide users with richer functions In this way, users will have more trust in the Internet of Things networking technology, and accordingly, the reliability of the Internet of Things networking technology in China will be greatly improved, so as to play a greater advantage.光 Electric hybrid Internet of Things networking technology is a key support technology for many industries at this stage. If there is no development of Internet of Things networking technology, the online sales industry and the physical retail industry will not be able to get rapid development, which shows the importance of Internet of Things networking technology. Therefore, we need to carry out in-depth research and discussion on photoelectric hybrid Internet of Things networking technology, in order to develop a more advantageous Internet of things platform and better serve the public. This paper mainly focuses on the development of Internet of Things networking technology advantages technical points to improve security. This paper analyzes the problems in expanding the application scope and summarizes several measures to better apply the photoelectric hybrid Internet of things networking technology, hoping to bring certain help to the relevant institutions and personnel.

Aiming at the above problems, in order to meet the communication requirements of photoelectric hybrid network structure, a research based on cloud computing and big data technology is proposed [5].The main content of this study is based on the analysis of cloud computing and big data technology, through the study of technical characteristics, using topological optical link with bypass data structure and other methods, and finally through experiments and analysis to build the research means of cloud computing and big data technology. The structure design of opto-electronic hybrid network and the transmission control of opto-electronic hybrid network realize the common transmission of data in optical domain and electrical domain. The performance evaluation is carried out by using simulation tools. The results show that compared with the traditional electrical domain network, the network designed in this paper has higher transmission performance, less congestion, and higher system throughput. The research based on cloud computing and big data technology can meet the needs of photoelectric hybrid network structure in communication.

3. Research Method

3.1. Cloud Computing and Big Data Technology Research

3.1.1. Technical Characteristics of Cloud Computing and Big Data Technology. Cloud computing technology breaks through previous computing concepts and fully subverts the definition of time and space. Meanwhile, it virtualizes computing resources and computing requirements. In the process of computing, its operating environment and operating platform can be migrated and expanded anytime and anywhere, and data can also be backed up [6].

The computing capacity of cloud computing is extremely powerful. With the computing function of related servers, the computing requirements can be adjusted and upgraded anytime and anywhere. Meanwhile, the virtual computing mode can be expanded to meet the demand for more computing capacity.

Capability deployment cloud computing can be created according to established requirements to meet specific requirements of directional software. It can integrate data for different databases and deploy data according to different computing requirements. It can realize multidomain integration of user requirements and platform functions with the help of cloud computing technology.

Super high flexibility in cloud computing in today's Internet application process is mostly based on software technology, hardware equipment, and other related content to calculate and comb. The relevant representatives are the network storage, software development, and data structures. Personalized management of virtual resource pools in the cloud system can not only meet the basic environment of different system configurations, but also obtain high-quality computing capabilities [7].

High safety cloud, albeit with the help of network computing resources of the cloud server data computing, but does not affect the normal operation of the cloud server, when supplying the service function of server problems at the same time, also can use virtualization technology, the computing tasks, and the requirement of the first degree

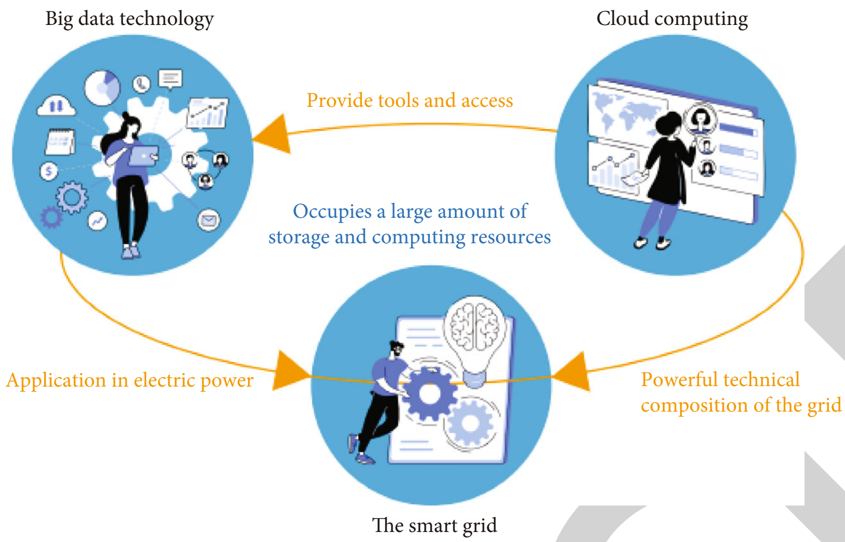

Figure 1: Cloud computing and big data technology.

distribution computing tasks and ensure complete corresponding computing tasks in other server. In addition, the current computing capacity can be upgraded and expanded with the help of the cloud's scalability function [8].

The characteristics of big data technology are different from those of cloud computing technology. The data groups of big data technology are not only the content provided by network data, but also include hundreds of types, involving all aspects of daily life. Meanwhile, the capacity of data packets determines the value and potential commercial space of data [9]. The core advantage of big data technology is that it can extract and capture massive data to meet users' directional needs. At the same time, the speed of acquiring target data is extremely efficient, which is the goal that traditional data application technology cannot achieve. At the same time, in the process of data processing, the corresponding results can be timely changed according to the changes of tasks. In the face of huge computing requirements and computing capacity, the authenticity and efficiency of processing data are well guaranteed. Due to the variety of types and contents of data, the process of screening is extremely complex.The degree of application and attempt in different fields is effectively reflected by the difficulty of data screening.When the data comes from a large number of data platforms and sources, the computational difficulty and application difficulty will also increase. In the field of Internet, big data technology has been applied unprecedentedly and, combined with multiple network systems, to achieve full coverage of the target group.

3.1.2. Trends in Cloud Computing and Big Data Technology. The development space of cloud computing and big data technology is very broad, and the corresponding industry content and industry types also cover a wide range, which has become the basic RESEARCH and development technology in various fields. Therefore, strengthening the computing capacity of cloud computing and the refinement degree of big data technology has become one of the important development contents of the industry [10]. On the one hand, with the highly increase of user data, the corresponding selection criteria and extract more detailed content, such as someone stand 5 minutes in A commodity, B goods stand 50 seconds, but bought goods B, in which data is created that needs to be further mining, to understand the current affects the pain points of user needs, thereby helping to boost sales performance and related businesses. On the other hand, the continuous improvement of computing power requires that the accuracy of extracted data should be ensured in the process of sorting out and extracting user information. For example, a user's car cushion is used as a congratulatory gift for a colleague's car purchase, but the relevant platform still pushes more related products, failing to distinguish the core appeal of users, resulting in the failure of accurate marketing to users in a specific period of time. With the development of cloud computing technology, it is necessary to constantly improve the accuracy of computing content and timely excavate and refine users' various needs, so as to realize the application value of relevant technologies. Big data technology, on the other hand, needs to scientifically refine the data content and reduce the interference of invalid data, so as to ensure that the data pooling process can be more specific and clear and reduce the research and investment of invalid data.

3.2. Systematic Design

3.2.1. Topological Structure. In order to facilitate horizontal data transmission in the data center network, a two-layer multi-tree structure is adopted to add optical domain network on the basis of the existing electrical domain network of the data center to realize the common transmission of data. To facilitate system management, the control center module is configured with the flow management module and the optical switch management module. The electrical area network is used to transmit data with low traffic, while the optical area network is used to transmit data with high traffic and some data of nearby links [11]. Switch nodes are connected to both electrical and optical domain switches. The optical switch management module is responsible for establishing and removing optical links According to the traffic information sent by the traffic management module, the control center notifies the management module of the optical switch to set up an optical link on the link that meets the traffic requirements, controls the transmission of some data on nearby links using optical links, and instructs switch nodes to modify the routing information configured with optical links. Each cabinet houses multiple servers. Servers are connected to switches in the cabinet. Switching nodes contain one or more flow tables and a group table for data packet query and transmission. When receiving data packets, the switching node queries the flow table in sequence. If it successfully matches a flow entry, the statistical data corresponding to the flow entry is updated, including the number and length of successfully matched data packets. After performing corresponding operations, the data packets are forwarded [12]. The switching node collects statistics on the total number of successfully forwarded packets in a period of time and the number of discarded packets and other traffic information and sends the traffic information to the traffic management module, as shown in Figure 2.

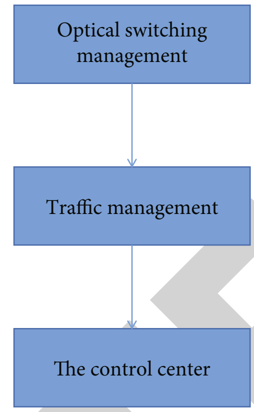

Figure 2: Measurement and control of flow.

3.2.2. Optical Links Carry Offline Data. After an optical link is established, the capacity of the link expands to provide more and faster data transmission services. The link with a long response time and congestion becomes unblocked. In addition, the link can also carry part of the data of adjacent links, realizing the common transmission of data in the optical and electrical domains, reducing the data backlog of nearby links and making full use of the optical link [13]. For the data carried by optical link, the distance they need to travel may be increased compared with the original path, but the original path has a slow exchange rate, limited capacity, and long waiting time, while the optical link has a large capacity and high speed, and the time it takes them to reach the destination site is shorter than the original path, as shown in Formula (1):

$$N_e \geqslant \frac{N_o \cdot S_e}{S_o} + (H_1 + H_2). \quad (1)$$

After the establishment of optical link, the path weight changes, and the system path cost matrix needs to be rebuilt. On the one hand, the path cost weight of optical domain changes, so the corresponding path weight should be adopted to meet the requirements of link change. On the other hand, the electrical domain link near the optical link can be equipped with optical domain for transmission, so as to provide more data for optical domain transmission, improve the transmission efficiency of optical domain, and reduce the transmission pressure of electrical domain, as shown as follows:

$$C_o = \alpha \cdot \frac{S_e}{S_o} C_e + C_u. \quad (2)$$

3.2.3. Simulation Experiment. In this paper, network simulation tools Opnet and Matlab are used to simulate the operating environment of the network, and simulation experiments are carried out to evaluate the network performance. According to the characteristics of data center network traffic, the arrival time interval of data flow and each distribution set multiple parameters to generate data flow simulate the diversity of network flow [14]. In addition, in order to simulate the complexity and diversity of network environment, experiments under light and heavy load environments were carried out. ESM in the simulation experiment is the result of electrical domain switching mode, and HOESM is the result of photoelectric hybrid network in this paper.

The switching node is limited by its processing capability. The data packets that cannot be processed need to be cached, and the cache capacity is limited. If the number of overflows on a switching node exceeds the threshold, subsequent data packets cannot be cached. The number of overflows of nodes under heavy load environment is shown in Figure 3. Optical links are established between nodes with large flow, with fast switching rate, and some data of nearby links are loaded [15]. Therefore, the number of overflows in HOESM is significantly lower than in ESM.

In light load environment, the nodes are classified, and the overflow number of different types of nodes is examined [16]. One is the optical link node in HOESM and this part of the ESM, called class A node. The other is the nodes near the optical link in HOESM and this part of the ESM, called class B node. The overflow number of class A nodes is shown in Figure 4. As the capacity of optical links is large, HOESM carries data near optical links, and more data is transmitted on optical links, resulting in overflows. As can be seen from Figure 4, the number of overflows on optical links is much lower than that of ESM overflows of class B nodes, as shown in Figure 5. In HOESM, some data in nodes is transferred to optical links, which reduces the transmission pressure in the electrical domain. This is why the number of data overflows in HOESM is significantly reduced [17].

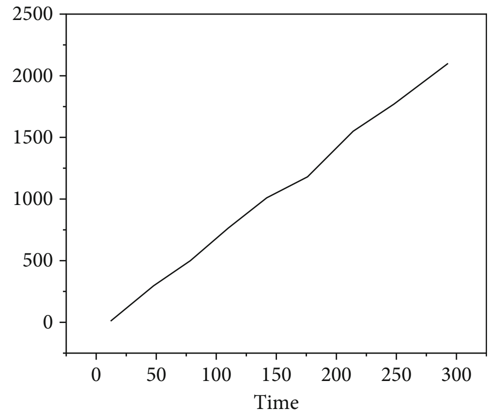

Figure 3: Heavy load overflow number.

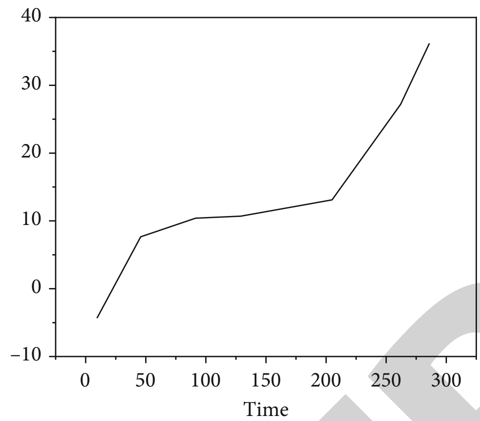

Figure 4: Overflow number of light load Class A nodes.

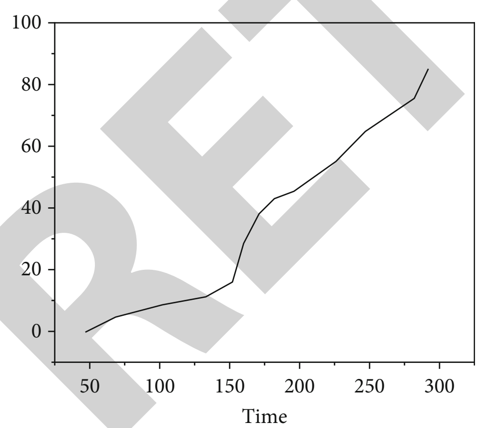

Figure 5: Overflow number of light load Class B nodes.

4. Interpretation of Result

The cost weight affects the transmission range of optical link. By setting parameters, the cost weight of optical link can be adjusted to control the range of optical link carrying nearby links [18]. The path c-f-i-l-o-r is an optical link, using optical switching, and the rest are electrical domain transmission. The cost weights between nodes are set as follows: transverse paths A-D-G-J-M-P and B-E-H-K-N-Q,the weights of the longitudinal paths A-B-C, D-E-F, G-H-I, J-K-L, -M-N-O, and P-Q-R are all 70,Oblique path b - f, a - e - I, d - h - l, g - k - o, j - n - r, m - q, b, d, c - e - g, f - h - j, I - k - m, l - n - p, o - q has a weight of 90. During the experiment, when the weight is 60, only the path to R is changed among the 6 destination nodes, which is equipped with optical link F-I-L-O, and the other nodes are still electrical domain transmission [19]. When the weight value is 50, the path of destination node Q also changes. Data transmission from B to R and Q uses optical link carrying weight. When the weight value is 40, n and P are added to the destination node carrying data on optical link.

Table 1: Change the path.

Weight	Destination node	Path
60	r	b-f-i-l-o-r
50	q	b-f-i-l-o-q
40	n	b-f-i-l-n
40	p	b-f-i-l-n-p
20	k	b-f-i-k
20	m	b-f-i-k-m

It can be seen from Table 1 that the weights of optical links are 60, 50, and 20, respectively. When the weights of optical links become smaller, more paths of node B to the six destination nodes can be transmitted through optical links, which can control the range of nearby links carried by optical links [20].

5. Conclusion

The photoelectric hybrid network structure to meet demand in the communication based on cloud computing and big data technology on the basis of the research is put forward the main contents of cloud computing and big data technology analysis, through the study of technical characteristics, using the topology and optical link with bypass method such as data structure, and finally through the experiment and analysis of the construction of cloud computing and big data technology research means. The structure design of opto-electronic hybrid network and the transmission control of opto-electronic hybrid network realize the common transmission of data in optical domain and electrical domain. The performance evaluation is carried out by using simulation tools. The results show that compared with the traditional electrical domain network, the network designed in this paper has higher transmission performance, less congestion, and higher system throughput. The research based on cloud computing and big data technology can meet the needs of photoelectric hybrid network structure in communication.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

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