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Retraction

Retracted: Data Transmission and Processing Analysis of Power Economic Management Terminal Based on the Internet of Things

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1].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.

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[1] H. Tang, "Data Transmission and Processing Analysis of Power Economic Management Terminal Based on the Internet of Things," *Journal of Sensors*, vol. 2022, Article ID 2649993, 8 pages, 2022.

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Research Article

Data Transmission and Processing Analysis of Power Economic Management Terminal Based on the Internet of Things

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In order to explore how the power economy can realize the data transmission and processing of the management terminal, this paper presents a data transmission and processing analysis of the power economy management terminal based on the Internet of Things. This method explores the research on how to realize the data transmission and processing of management terminal in power economy through the key technical problems and solutions of information recommendation based on the Internet of Things. The research shows that the efficiency of data transmission and processing analysis of power economic management terminal based on the Internet of Things is about 65% higher than that of traditional data analysis. Improve the overall quality of employees in power enterprises and inject new vitality into the development of power economy.

1. Introduction

With the rapid development of information technology in today's society, the rapid development of massive data sharing on the Internet has promoted the rapid arrival of the big data era [1]. In recent years, with the rapid popularization of the Internet of Things technology and a large number of R&D and deployment of intelligent terminal equipment of the Internet of Things, while the types and number of intelligent Internet of Things applications are growing, the Internet of Things systems and equipment are becoming more and more popular in people's daily life. The Internet of Things devices and platforms have strong heterogeneity, closed platform architecture, high coupling, poor scalability, and a series of other problems, leading to fragmentation of the Internet of Things applications, making the development of big data platforms for intelligent Internet of Things applications costly and long cycle [2].

China Power Grid Corporation implements the new energy security strategy of "four revolutions and one cooperation," puts forward the strategic goal of "an international leading energy Internet enterprise with Chinese characteristics," and fully performs its political, economic, and social responsibilities. Put forward the strategic goal of building an international leading energy Internet enterprise with Chinese characteristics, and it is required to carry out the digital empowerment project, implement the digital transformation, and carry out the construction of "urban energy brain" [3]. Under the above background, there is an urgent need to study "big data of energy and power economy," and it is required to dig deep into the value of energy and power data to continue to provide strong support for the steady and healthy development of economy and society [4].

As a kind of clean energy, electric energy is widely used in the world. It is a kind of energy integrated by higher technology. At present, China's power enterprises are showing a new trend of large-scale power production, which not only promotes the efficiency of power production but also increases the economic benefits of power enterprises. The expansion of power production scale has also expedited the development of new power technologies. At present, China has made certain technological breakthroughs in the field of power generation, transmission, and transformation and realized the synchronous improvement of production efficiency and economic benefits. Under the guidance of power demand and the government, the scale return of China's power enterprises has changed in three stages, from increasing to constant to decreasing. At present, most Chinese enterprises, especially the energy industry, have gradually stabilized their demand for electric energy, and the change of electricity price will not have a significant impact on the change of enterprise production [5].

With the development of new technologies such as Internet technology, information technology, and big data technology, the energy and power industry and enterprises have invested a lot of energy and financial resources in information development and have made great achievements in big data application. However, there are still some deficiencies in the collection, management, and analysis of big data in the energy and power industry. In the era of big data, the energy and power industry has a large amount of data, so it puts forward higher requirements for data collection, storage, classification, and security management. In the past, energy and power enterprises did not make good use of and promote the massive data in the emerging stage, resulting in the fact that the collection process of more data may be different from the actual situation. At the same time, they cannot effectively distinguish the quality of the data. In the face of expired or erroneous data, they cannot timely screen and update, so the quality of the data cannot be guaranteed [6].

The data transmission middle tier platform is a bridge connecting intelligent hardware terminals and web cloud servers. The data middle tier platform is the core component of the entire Internet of Things system. The middle tier platform is closely related to the security and reliability of information and acts as a solid bridge and link between the application devices and sensing devices of the Internet of Things. The biggest advantage of the data transmission middle layer platform is that it provides the most powerful support for the data transmission of the Internet of Things applications, strengthens the application effect of the Internet of Things, and improves the economic benefits of the Internet of Things applications. The data transmission middle layer platform consists of three main parts [7]. The design of IoT data transmission and processing middle layer platform is shown in Figure 1.

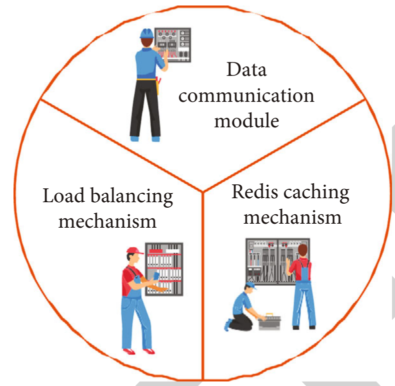

Figure 1: Overall design of m-server platform.

2. Literature Review

Liang et al. said that from the perspective of the Internet of Things system as a whole, the world is in a high-speed development stage, including the standards and corresponding services of the Internet of Things. The continuous improvement of the Internet of Things-related technologies has accelerated the rapid establishment and growing of the Internet of Things knowledge system [8]. On this basis, the standard system of the Internet of Things urgently needs a unified standard, so as to continuously establish and improve the product system. It is expected that the IoT system market will achieve explosive growth worldwide in the next few years. Yu et al. said that it can be predicted that in the past five to ten years, the Internet of Things system will be more rapidly popularized and used worldwide [9].

To this end, the developed countries in the West and Asia quickly responded and issued many strategic policies to escort the Internet of Things industry. The United States has put forward the "smart earth" plan, which focuses on the research of the core technology of the Internet of Things applications. Yang et al. put forward a 14-point action plan on the Internet of Things industry, and Japan put forward the "u-japan plan" on the Internet of Things. These global government plans regard the Internet of Things as one of the primary strategic objectives of the current national economic construction and scientific and technological development [10].

Lin proposed that knowledge and information will be obtained from the collection and analysis of complex and huge digital data to improve the ability [11]. Jadaun et al. said that India, with the second largest population in the world, has also actively used big data in recent years, hoping to create a more convenient and people-friendly smart and civilized city [12]. As early as a few years ago, in the plans of the British government and the Japanese government, big data became one of the key decisions. The government increased its investment in the big data industry and focused on big data application technology to drive enterprises' investment in the big data field.

Ron et al. think that the Internet of Things application development platform is quite popular at this stage. At present, bat has basically disclosed its Internet of Things big data platform architecture, and some information can be queried from the Internet. There are also many technical introductions about the Internet of Things big data platform, but under its mechanism and environmental system, there are limited things that can be used for reference for traditional enterprises. Technology ultimately serves the business. There is no need to pursue progressiveness. Each enterprise should choose its own technology path according to its own actual situation [13]. Jiang et al. believed that various technologies of the existing online framework are relatively mature and have been applied in different workplaces [14]. However, these technologies are still relatively weak in terms of performance and user experience. At the same time, there is no complete set of private platform technical services in the market, so the purchase price is expensive, and there is no open source technology framework suitable for scientific research and small enterprises. However, as an important part of unstructured data, terminal data has not been well processed. The transaction record and interactive record data in unstructured data are mainly used by major enterprises around the world for management and analysis using distributed systems, while the processing of terminal data types has not been effectively promoted. For IoT data, tens of millions of real-time data sent by terminals every day are discarded or stored without reasonable analysis and eventually become dead data. Therefore, how to use the existing distributed methods to solve the problem of the Internet of Things data is very necessary and meaningful.

Gong et al. believed that in the 21st century, electric power enterprises have ushered in rapid development. With the support of modern science and technology, the power technology upgrading of electric power enterprises has been realized. Chinese electric power enterprises have made a series of adjustments to the existing structure and made certain development achievements [15]. At present, China has built three nuclear power bases with a total installed capacity of 8.7 million KW. On the whole, the construction and operation of China's power grid are in good condition, showing an increasing trend both in terms of scale and transmission and transformation capacity. The new changes in power economic operation are mainly reflected in the following aspects: (1) the growth of power generation. With the support of Internet information technology, the interconnection of China's power grid system has been popularized. It not only increases the exchange frequency of regional power grids but also optimizes the cross regional allocation of power resources. In this process, the electricity exchange mode also presents a diversified development trend. In order to supply power to power scarce areas and regions, most power grid enterprises carry out high-power cross regional and cross provincial power transmission for a long time. This measure has improved the current situation of power supply shortage in some areas to a certain extent. (2) Electricity demand continues to grow. Electricity is closely related to economic and social development, and the change of electricity consumption is an important "barometer" of economic development. With the development of social production and enterprises, the demand for electricity is increasing, which is more prominent after the reform and opening up. (3) The economic benefits of power enterprises grew steadily. With China's attention to the development of power enterprises and the support of China's policies, the economic growth of power enterprises is in a sustained and stable state.

3. Method

3.1. Smooth Weighted Polling Algorithm. To realize software load balancing on the data transmission middle layer platform, algorithms need to be added to ensure that the load can be evenly distributed. Select one server among multiple servers as the master server of the load balancing server. The master server installed with the load balancing server (Nginx server) provides the only interface between the data transmission platform and the outside world. The main function of this interface is to distribute requests to subservers. The Nginx used by the platform is a reverse proxy server. A smooth weighted polling algorithm is added to the Nginx server to achieve load balancing [16].

The external requests are processed through the polling algorithm and then allocated to each subserver in turn. The polling algorithm is too weak in monitoring the performance of the subserver. After the request is allocated, there will be floating load imbalance. It is improved on the basis of the polling algorithm, and then, the smooth weighted polling algorithm is implemented [17].

The flow of the smooth weighted polling algorithm is shown as follows:

(1) In the process of configuring files, each subserver needs to be configured with a weight C, which is fixed. Next, the current weight NC of every subserver is defined. The initial value of NC is O, and then NC adjusts it according to polling. The value of NC will eventually become the key to the selection of subservers

(2) After the master server receives the external request, it immediately traverses the subserver. The original subserver weight NC plus the assigned weight C refreshes the current subserver weight NC, as shown in

$$\mathrm{NC} = C + \mathrm{NC} \tag{1}$$

(3) Definition: a new variable P; P is the sum of the weights C of all subservers, as shown in

$$P = \sum_{i=0}^{n} Ci \tag{2}$$

(4) After traversing and polling all the subservers once, select one of the subservers m, and the current weight NC of the subserver m is the largest among all the subservers, as shown in

$$M = \mathrm{Max}(\mathrm{NC}_\mathrm{i}) \tag{3}$$

(5) The current weight of the selected subserver m minus the sum of all subserver weights P refreshes the current weight value NC of the subserver m, as shown in [18]

$$\mathrm{NC} = \mathrm{NC}\text{-}P \tag{4}$$

The implementation of smooth weighted polling algorithm is now complete. Adding a smooth weighted polling algorithm to load balancing can not only distribute the load services of subservers based on the weight ratio of each

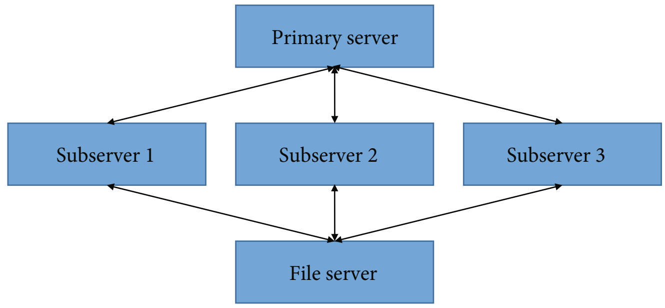

Figure 2: Relationship architecture between servers.

Table 1: Weight of four server requests.

Request number	NC (before selection)	Selected server	NC (after selection)
1st time	{4,2,2}	M1	{-4,2,2}
2nd time	{0,4,4}	M2	{0,-4,4}
3rd time	{4,-2,6}	M3	{4,-2,-2}
4th time	{8,0,0}	M1	{0,0,0}

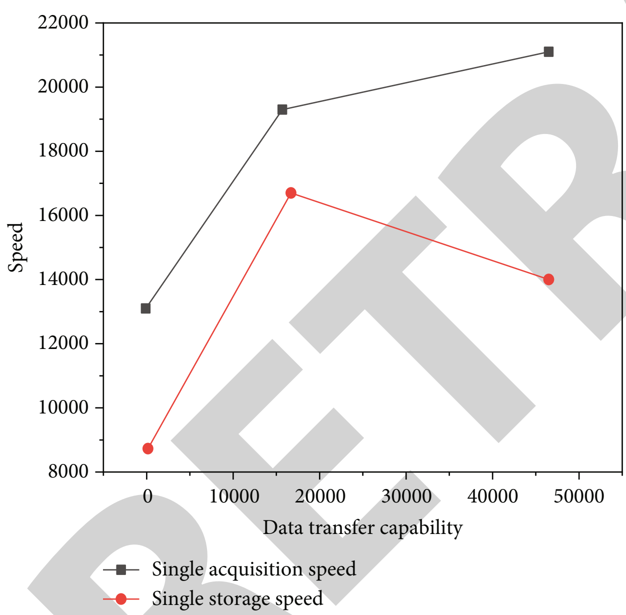

Figure 3: Data transmission capability for high concurrency request orders.

subserver but also maximize the average distribution of load balancing. There will be no case that connected requests are allocated to the same subserver at the same time.

The data transmission server is composed of multiple cloud servers. The server is divided into three parts: the main server, the subserver, and the file server. The servers in the three parts handle different business logic and support different functions. The server responsible for receiving external requests is the master server. The master server assigns requests to the following subservers. The subservers operate database access and file read/write based on the same file server [19]. See Figure 2 for the relationship architecture between various parts of the server.

The weight distribution of the subserver in the four requests is shown in Table 1. According to the performance of subserver 1, subserver 2, and subserver 3, the weight of the subserver in the configuration is 2, 1, and 1, based on the smooth weighted polling algorithm.

The initial value of the current weight NC of each subserver before the first request is sent is {0,0,0}, and the current weight NC of the selected subserver for the first request is {4,2,2}[20]. It can be known that the selected subserver is 1 for the first time. After selection, the current weight NC of the subserver is refreshed to {-4,2,2}. Requests after the first request follow this rule. When the number of requests sent is accumulated to 4, the current weight NC of the subserver will be refreshed to the initial weight NC of {0,0.0}, and the current weight NC of the subsequent request subserver will repeat this process. From Table 1, it can be seen that when each request reaches 4 times, subserver 1 will be selected twice, while subserver 2 and subserver 3 will only be selected once, which is consistent with the weight C ratio of each subserver. If the number of requests is 8, the number of the selected subserver is {m1, M2, m3, M1, M1, M2, m3, m1}, and the assigned subserver is not {m1, M1, M1, M1, M2, M2, m3, m3}. The latter is assigned in a disorderly manner [21]. When the distribution is uniform according to the rules, load balancing optimizes the server performance to the greatest extent. Different requests such as files and session caches of the same client are allocated to different subservers, which will affect the operation. In this platform, the file server can be used as database step input and static file storage.

Through mathematical statistical analysis, the corresponding data distribution and probability density can be obtained, and a threshold about the reference value Z can be obtained by setting an appropriate proportional value. Since the data distribution has no obvious characteristics and influence relationship, starting from the law of central limit point, it can be considered as normal distribution as shown in formula (5), and the probability density of P is shown in

$$P \sim N\left(\mu, \sigma^2\right), \tag{5}$$

$$f\left(\mathrm{Avg}(c), \mu, \sigma^2\right) = \frac{1}{\sqrt{2\pi\sigma}} \exp\left[-\frac{1}{2\sigma^2}\left(\mathrm{Avg}(c) - \mu\right)^2\right]. \tag{6}$$

Through the theoretical calculation of maximum likelihood estimation, it is obtained as shown in

$$\widehat{\mu} = \widehat{P}, \tag{7}$$

$$\widehat{\sigma}^2 = \frac{1}{n}\sum_{i=1}^{n}\left(Pi - \bar{P}\right)^2, \tag{8}$$

$$\widehat{P} = \frac{\sum_{i=1}^{n} Pi}{n}. \tag{9}$$

After estimating two unknown parameters, the distribution can be calculated according to the standard normal distribution, as shown in

$$\frac{(P-\mu)}{\sigma} \sim N(0, 1). \tag{10}$$

The heartbeat data in the data transmission may be highly concurrent, and the heartbeat data format needs to be agreed between the terminal and the web server during the transmission process. This design adopts the Redis cache mechanism to ensure the cache interaction with the MySQL database during the heartbeat data transmission. The heartbeat transmission data format is consistent with that stored in Redis in the form of key value pairs. In the data format, WD001 represents the key, and the time is the corresponding time. The heartbeat data is stored in memory, which makes the data processing speed very fast. The data transmission capability for high concurrency requests is shown in Figure 3.

3.2. Multisite Configuration of uWSGI. Deploy multiple web service platforms on the same server to implement multiple sites (that is, a set of programs that can bind multiple domain names or subdomain names). Each site has independent web services, which can greatly reduce the trouble of maintaining and updating multiple Django platforms, save server resources, maximize the sharing and utilization of server resources, and reduce unnecessary expenses for enterprises. uWSGI is the most convenient component for deploying Python sites at present. It is very simple to configure a single site. Deploying multiple sites on the same server is a little more complicated. The configuration flow chart is shown in Figure 4. Multiple sites here refer to multiple sites using the same Nginx and uWSGI main process services, which are usually distinguished by domain names [22].

Big data planning for energy and power economy: based on the focus of social and economic development and the overall strategy of the state grid, with energy and power as the starting point, power data as the basis, integrating other external data, big data as the focus, and service economy as the entry point, the "energy and power economy big data" system architecture is planned for the government, enterprises, and internal [23].

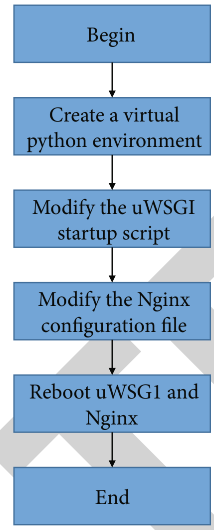

Figure 4: Configuration flow chart.

Technical model related to big data of energy and power economy: (1) energy and power economy big data acquisition technology. With the wide application of big data technology, the growth of energy and power big data in quantity is also huge. Through the application of energy and power economic big data collection technology, the ultimate goal is to collect data on the energy consumption characteristics of different energy and power users and then analyze and classify customers. Therefore, the data collection to be completed by this module mainly includes the user's power consumption, power consumption characteristics, voltage level, regional characteristics, and other information, as well as the user's regional economic conditions, climate characteristics, electricity price policies, and other relevant data information that have an impact on the power load. After data collection, the data can be extracted and input into the big data platform for later data analysis. (2) Integrated management technology for big data of energy and power economy. After the big data is collected and input into the big data platform, energy and power enterprises can classify and manage the data in the big data platform and establish a special data set targeted. The accuracy, integrity, and repeatability of the data in the data set shall be verified and checked. The wrong values shall be corrected, the missing ones shall be supplemented, and the repetitive data shall be sorted out and deleted. At the same time, the attributes and accuracy of the data shall be well managed, and the format of the data shall be standardized and unified, so as to lay a good foundation for later data analysis. (3) Analysis and processing technology for big data of energy and power economy. The analysis and processing technology for energy and power economic big data is to filter and extract the massive data information in the database, analyze and manage the useful information pertinently, and apply the analysis results to practical work, so as to provide data support and theoretical basis for the production, operation, and other activities of energy and power enterprises [24]. In the process of analysis and processing, users can be classified according to their

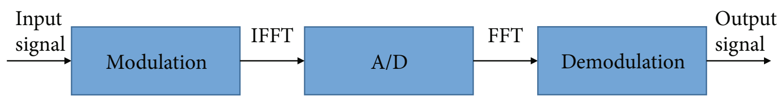

Figure 5: Working principle of wireless bridge.

characteristics, power consumption, and other information. At the same time, different data sets based on regions, industries, and categories can be established to provide reference for enterprise decision-making. (4) Presentation technology of big data of energy and power economy. The analysis results of power economic big data can be comprehensively displayed at different levels and different design scenarios, and more diversified data representations can be mined, so as to realize information transmission and matching between related data and provide value-added services in economic aspects for enterprises.

3.3. Wireless Bridge. Wireless bridge is the link equipment to realize the wireless network connection and to realize the wireless network bridging, that is, to establish a bridge to transmit data and information among two or more communication networks. In the link layer, LAN interconnection is realized to store and forward information, which is used for long-distance wireless networking between digital devices.

The main working modes of the commonly used wireless bridges in practice are point-to-point (PTP) and single point-to-multipoint (PTMP). (1) Point-to-point (PTP) wireless bridge equipment is generally composed of a pair of bridges and a pair of antennas [25]. The two antennas must be placed in a relative orientation. The outdoor antenna is connected with the indoor bridge through cables, and the bridge is physically connected with the network. (2) Single point-to-multipoint (PTMP) wireless bridge equipment can interconnect the networks in multiple peripheral areas into a whole. Its structure is relatively complex. It needs to use omnidirectional antennas or a large number of wireless network cards and antennas. Point-to-multipoint communication mode is mainly used in digital oil fields.

In this system, the Breeze ACCESS VL wireless bridge of Israel ovitone company is used. It adopts OFDM orthogonal frequency division multiplexing technology and has the advantages of high throughput, long-distance transmission, high reliability, anti-interference, and multipath effect, which meets the needs [26]. It also provides 10/100 mbps Ethernet interface, which has low investment and operation cost and convenient and fast installation, and its working principle is shown in Figure 5.

4. Results and Analysis

With the continuous development of modern Internet information technology, the traditional power enterprise operation system can no longer meet the needs of modern society. It is necessary to establish a strong power grid system, and the realization of the power grid system depends on the support of information technology. As the core competitiveness of power enterprises, excellent informatization talents are the human guarantee to realize the intelligent development of power enterprises. However, from the current development of power enterprises and the application status of informatization technology, some of them are still in a backward state, which hinders the application of artificial intelligence technology in the power economy. The lack of effective information feedback and exchange mechanism has become an urgent problem to be solved in the construction of power informatization [27].

The Breeze ACCESS VL wireless bridge adopts orthogonal frequency division technology (OFDM). When receiving data, the transmitter first modulates the data signal, transforms the frequency domain signal into time domain signal through inverse Fourier transform, and converts the time domain signal into baseband signal through digital to analog conversion. The receiver converts its fast Fourier transform into frequency domain signal of the same frequency and demodulates it into the original data signal information [28].

The remote bridge sends video data and oil well data collected by RTU module to the central bridge of the monitoring center in the station. The central network bridge is connected with the industrial control computer through the switch. The data processing and analysis software installed in the industrial control computer analyzes and processes the video data and oil well data and displays the results on the display screen of the monitoring center.

The Breeze ACCESS VL bridge consists of a base station central unit Au and a user unit SU. The central unit of the base station is connected to the backbone Ethernet through the RJ-45 connector. The user unit SU can be connected to the backbone Ethernet with RJ-45 connector, or the remote network can be connected to the central point through the central unit of the base station, so as to support multiple workstations.

The base station central unit Au is installed in the base station to communicate with the user unit (SU). Each base station central unit includes indoor and outdoor unit parts. The indoor unit is connected to the uplink equipment through a standard IEEE802.3 Ethernet 10/100bastt (RJ-45) interface and to the outdoor unit through a Cat-5 cable. The outdoor unit is connected to the sector antenna. According to the actual needs, the system uses a 120° sector directional antenna to connect to the base station center bridge, making full use of the spectrum to ensure efficient and reliable data transmission.

The development of electric power enterprises has certain particularity. The traditional ideas of enterprise employees will restrict the efficiency of electric power economic operation and management to a certain extent. In the final analysis, the competition among power enterprises is the competition of human resources. Therefore, under the background of market economy, we must innovate the form of ideas, learn from the advanced management experience of the United States and excellent enterprises, and adjust the internal structure of enterprises to adapt to the development environment of market economy. Regularly organize enterprise employees to receive professional training, and select personnel with rich management experience and professional quality in the selection of power enterprise managers.

5. Conclusion

With the deepening of the application of Internet technology in the energy and power industry, an integrated ecosystem of energy and power applications will continue to be formed, and energy and power big data will have richer connotations. The integration and analysis of more internal and external data of the energy and power industry will make the energy and power economic big data form an important value chain effect and promote the generation of new business models and consumer service forms. At the same time, the application of big data in energy and power economy will also enter a new height with the continuous development of big data technology. Electric power economic operation is related to the national economy and the people's livelihood and is an important force for national economic growth. Electric power enterprises should strengthen the adjustment of internal management mechanism of electric power enterprises, optimize resource allocation, and promote the improvement of economic benefits of electric power from the aspects of system construction, electricity price adjustment, information construction, and so on.

Data Availability

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

Conflicts of Interest

The author declares that there are no competing interests.

Acknowledgments

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