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Deepening research on grid system complexity

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ABSTRACT. Due to the complexity and particularity of the power grid system, a large amount of information resources need to be transmitted and processed, and the transmission and processing results are transmitted to the management analysis department in time through the communication facilities. Therefore, it is often easy to get into a paralyzed state. The research and development of power information technology has changed this traditional situation. The current power system combines power information technology with power communication technology and has achieved good results.

KEYWORDS: power system; information communication;

With the rapid development of science and technology, electronic information network technology has also made great progress. The power industry is one of the most important basic industries in China, and it is closely related to the development of people's livelihood. In recent years, the reliability and stability of power system power supply have been paid more and more attention, and power communication technology is the key to power supply systems. By integrating power communication with power information, it is beneficial to give full play to the role of power information[1-4].

1. Development status of power information communication major

1.1 Development status of power communication systems

At present, China's power system mainly uses ICT as a professional company for communication operation and maintenance. It is mainly responsible for the daily operation of the main line communication system of the power grid, and performs maintenance when necessary. Other responsible contents include the communication dispatching operation of the communication system and the backbone. Implementation and management of communication system expansion work, as well as value management and physical management of backbone communication equipment assets. In the current communication operation and maintenance system,

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ICT is not simply relying on rules and regulations to act, but will be based on the actual situation of the power enterprise, establish a communication professional maintenance as the support, focus on communication operations, and communicate scheduling. As the core typical business, it combines vertical and horizontal coordination with its own professional to realize professional maintenance, unified management and complete network of power system, providing guarantee and technical support for the stable and safe operation of the power grid[5-8].

1.2 Development status of power system information major

The information system control center is an important part of the power system. The ICT branch can protect the information system through the control center responsible for the information system computer room and network, responsible for the operation and maintenance of the information system, and the information system support service, system application and security. Stable operation. The specific responsible work includes customer service, information system maintenance and dispatching, etc., which provides a complete information operation and maintenance system for the normal operation of the power system. Enterprise information flow is mainly composed of four parts, namely data application layer, data management and storage layer, communication network shelf layer and equipment layer. The effective carrier of power system information operation is the information support system composed of these four parts. The information support system is the foundation of the power system, which can collect, analyze and integrate the basic information of the enterprise for the power system, and provide reliable information guarantee for the management, operation and production of the power enterprise[9-10].

2. Environmental factors for the integration of power information and communication technologies

2.1 Economic factors

With the development and improvement of science and technology, the development of the communication industry is increasingly diversified and integrated, and communication is integrated into various enterprises with its advanced technology and comprehensive application. The development of enterprises requires sharing and cooperation. Therefore, with the globalization of the economy and internationalization, enterprises and communications are inseparable, and communication plays a decisive role in the development of enterprises. The power industry has gradually recognized the importance of communication in the development of recent years. Whether in the transmission and processing of information or in the efficient management of enterprises, power companies need to integrate communication technologies into their China. If the factors are used reasonably, they can directly improve the economic benefits of the power industry. On the one hand, through the integration of power information and power

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communication, not only can the financial management of the enterprise be fully strengthened, but also the goal of economic development can be further realized and improved. With the increasingly fierce competition among power companies, the economic strength of enterprises is in urgent need of improvement. Through the in-depth integration of communication technologies, the cost of information resource processing and sharing of enterprises can be greatly reduced, and the way to improve the economic benefits of enterprises can be more diversified.

2.2 Cultural environment

The era in which we live today is the era of information sharing. Information is everywhere around us, and we can process information in a variety of ways. Living in such a complex information environment requires reasonable and standardized management of information, otherwise information will have a negative impact on our lives. From a cultural perspective, the further improvement of today's power grid system is attributed to the improvement of social and cultural levels. The civilized and pure communication and information environment not only creates an orderly and comfortable human working environment for employees, but also greatly enhances employees' work enthusiasm and work efficiency. The development of power companies under the main goal of serving the people will be more dynamic and enduring. Through a networked cultural environment, the way employees work will be more diverse. Power companies combine traditional power generation processes and management processes with modern communications and information technologies to visualize process and management, and at a glance of operational and target outcomes, which greatly reduces corporate incidents.

2.3 Technical environment

Nowadays, the development of enterprises requires technological innovation. Only with advanced technology, enterprises can seek their own place in the fierce competition, and the advantages of science and technology will lead the company to a higher world stage. The integration of information technology and communication technology in power companies is not a minority, but the level of integration and the effects achieved are different. Enterprises are not only pursuing the improvement of existing technologies, but also constantly pursuing the development and application of more new technologies. There are two technologies that are now the object of discussion among many power companies, incorporating core network technologies. This technology has played a huge role in improving the stability and reliability of power systems. What is important for power systems is the safety of their use, so the application of this technology is more competitive with modern grids. Integrate into access network technology. The generation and development of this technology further enhances the speed and accuracy of communication, and the work of the grid is more efficient.

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3. Measures to achieve effective integration of power information and communication

3.1 Strengthen basic technical training for employees

The technical level of the staff is the key to the power companies to improve the power information and power communication technology, so it is imperative to carry out the training of various basic technologies for the staff. Information and communication integration is a systematic project. It is necessary to establish a good communication and communication mechanism between departments, and employees should strengthen their emotions. Liaison and communication in understanding. Therefore, the specific content of the training should also include the training of communication skills and the training of professional functions to help employees improve their professional skills and enhance their ability to adapt to work stress.

3.2 Establish a standardized operation mechanism

The integration of various basic services is an important prerequisite for the effective integration of power information and power communication. This first requires power companies to develop a complete communication management system, improve relevant technical requirements, standardize the operation and maintenance of power communications, and enhance the feasibility of practical operations, so as to better supervise work and communication operations on site. Smoothly provide standardized technical guidance to improve the feasibility of on-site operation. On the other hand, perfect rules and regulations can provide a reference for employees to strictly implement operating procedures, which is conducive to promoting the improvement of communication quality of power systems. Power companies should also introduce advanced science and technology, invest funds to build information monitoring management centers and information system operation platforms, and then hire professional technical personnel to operate the system.

3.3 Establish unified scheduling of information systems

In order to achieve effective integration of power information and power communication, power companies must first establish an information communication scheduling department, and ensure the independence of the dispatching department and the equipment room, and provide a comprehensive integration of power information and power communication. Through the information management platform, the electric power staff can uniformly monitor the scheduling of information and communication, which is conducive to improving the utilization efficiency of information resources. Power communication technology has a strong professionalism, which can provide a transmission channel

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for power information, and then feedback the results of information monitoring through communication scheduling. In order to ensure real-time monitoring of the status of communication operations, power companies need to integrate the workflow of the power system, build a comprehensive power information monitoring system, and realize the integration of power system operation and maintenance, so that employees can control the information transmission status in real time and in time. Feedback is provided to achieve the goal of unified scheduling of communication systems. In the future, information and communication convergence will pursue a higher level of convergence and symbiosis. In order to cope with the development of smart grids and the emergence of massive data, it is necessary to establish a centralized data center, which includes information communication frontier technologies such as Internet of Things, cloud computing, and big data. It also includes infrastructure, property, environment, energy efficiency management and other aspects. Only the deep integration of information and communication can run and maintain a centralized data center.

In short, through the integration of power information and communication, it is conducive to improving the efficiency of employees and the utilization of resources, speeding up the construction of intelligent management of power grids, and improving users' satisfaction with power companies. With the support of the national technology environment, economy, and national policies, strengthening the integration and innovation of power information and communication technologies for power companies will help power companies make greater contributions to national economic development.

References

[1] Hongga Zhao. A New State Estimation Model of Utilizing PMU Measurements. Power System Technology, 2006.
[2] Dept. of Mechatron, Gwangju Inst. of Sci. feTechnol, Gwangju, South Korea Power system state estimation with fusion method. Computer and Automation Engineering (ICCAE). 2010(26). (71-76) .
[3] Wang Yong. State estimation based on phase angle measurement technology [D]. Hohai University. 2003.
[4] Zhao Junbo, Zhang Gexiang, Huang Yanquan. Current Status and Prospects of State Estimation of Power System with New Energy[J]. Electric Power Automation Equipment, 2014, 3(5): 7- 20, 34.
[5] PHAKE A G, BI T S. Phasor measurement units, WAMS, and their applications in protection and control of power systems [J]. Journal of Modern Power System and Clean Energy, 2018, 6(4): 619-629.
[5] Guo Wei, Wang Peng, Lin Jiaying, et al. Equivalent and local voltage control of distribution network model based on PMU measurement[J]. Electric Power System and Automation, 2019, 31(3): 61-68 .
[6] Bao Wei, Jiang Xuedong, Chen Liyue, et al. Optimal configuration of PMU for power system with 0-1 linear programming considering maximum redundancy[J]. Power System Technology, 2014, 38(8): 2051-2056.

ISSN 2616-5767 Vol. 2, Issue 3: 116-121, DOI: 10.25236/AJETS.020062

[7] MAZHARI SM, MONSEF H, LESANI H, et al. A multi-objective PMU placement method considering measurement redundancy and observability value under contingencies [J]. IEEE Transactions on Power Systems, 2013, 28(3): 2136-2146 .
[8] AHMADI A, ALINEJAD BEROMI Y, MORADI M. Optimal PMU placement for power system observability using binary particle swarm optimization and considering measurement redundancy[J]. Expert Systems with Applications, 2011, 38(6): 7263-7269.
[9] Zhao Hui, Zhao Shaohua, Wang Hongjun, et al. Research on Optimal Configuration of PMU Based on Piecewise Iterative Method[J]. Journal of Electric Measurement & Instrumentation, 2016, 53(13): 14-18.