

Big Data Application Technology and Prospect Analysis in Smart Distribution Network

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Abstract: Intelligent power distribution network system main application technology including the communications, computer and network, the modern electronic technology, etc., adapter power automation system main components for the master station, terminal automation monitoring system and communication system, has formed a complete collection, transmission and processing in the integration of information system, to realize the remote management of distribution network. The application of big data technology in smart distribution network makes it more intelligent and ADAPTS to the needs of social development. This paper analyzes the application technology and prospect of smart distribution network big data.

Keywords: Big data, Application technology, Automation technology, Intelligent distribution network.

1. Introduction

In the development of electric power in China, there is a corresponding proportion of power loss in the way of power transportation, and a certain proportion of power loss in energy efficiency related generators. In terms of technology alone, regardless of power plant or power transmission, the current technology can only achieve 45%~50% power generation efficiency under water level, which is a qualitative customer factor that cannot be changed. When the power generation is not used, the electricity will be converted back to the heavy force potential energy of the power plant into water or the electric potential energy stored by the battery, and in turn into mechanical energy and electric energy. However, there will be a loss of energy at each stage of transformation, so the loss in the middle is huge. Therefore, the development trend of intelligent power grid is to match the market demand for electricity with the power grid production, so as to slow down the waste of power resources and other resources. At the same time, the grid layout should be optimized to reduce the loss caused by power transmission. The realization of these goals requires the support of big data and the comprehensive application of various technologies [1].

2. Intelligent Distribution Network Big Data Application Technology

2.1. Smart Grid Communication Technology

The basis of the realization of smart grid is the construction of high-speed, non-unidirectional, highly integrated and real-time communication system. In the smart grid, whether it is data acquisition, data protection, or data control, the support of this communication system is required, and its establishment is the first step towards a smart grid.

The power grid has penetrated into thousands of households, and the communication system has also penetrated into thousands of households. The two closely

related networks of the communication network system and the power grid are gradually formed, and the goals and main characteristics of the smart grid can be gradually realized [2].

2.2. Smart Grid Measurement Technology

Smart grid measurement technology is the basic component of smart grid. Only by transforming the collected data into data information can it be supplied to each department of smart grid. With the help of smart grid measurement technology, the health status of power grid equipment can be evaluated and the integrity of power grid can be judged. In addition, meters can be read, electricity cost estimation can be eliminated, power theft can be prevented, power grid congestion can be reduced, and users can be better communicated with [3]. Therefore, the information integration technology is applied to distribution network online and off line data, user data, geographical graphics and power grid structure, realize the power distribution system Under normal operation condition or accident conditions set supervisor measurement, control, protection and utilization, and distribution management in the integration of intelligent system is of great value. Related technology of intelligent data network are shown in Figure 1.

3. Problems and Challenges in The Construction of Smart Distribution Network in China

3.1. The Implementation of Relevant Standards Is Weak and Ineffective

In recent years, the power industry and the State Grid Corporation have issued a series of standards on the construction and transformation of distribution networks, such as the Technical Guidelines for Distribution Automation and other documents, but the implementation is weak, resulting in some deviations in the specific implementation process, with little effect.

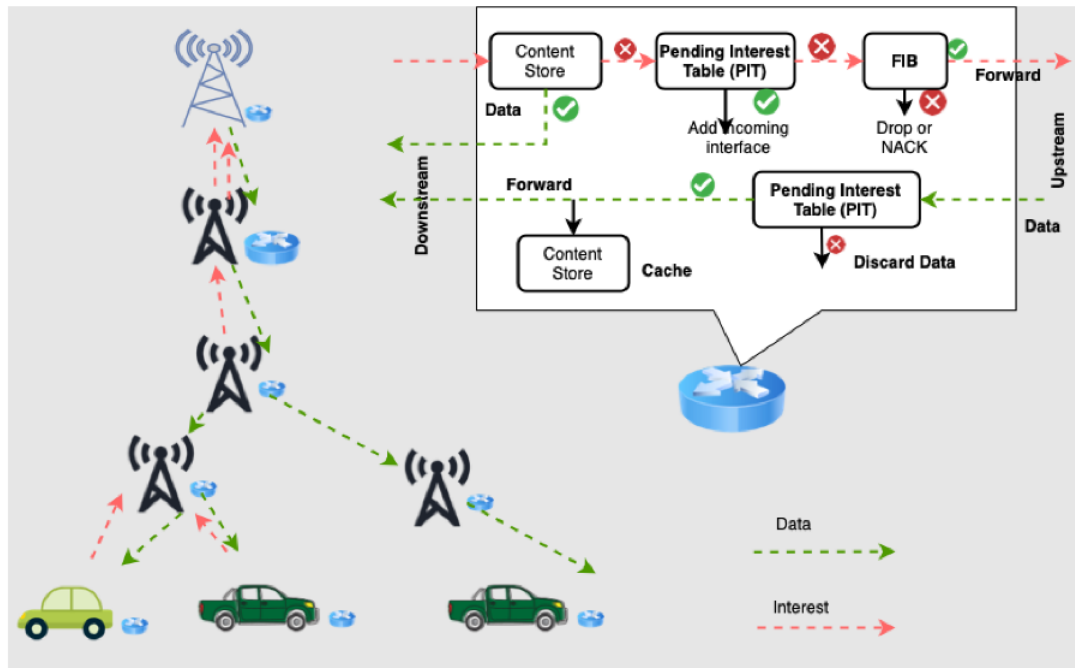


Figure 1. Related technology of intelligent data network

3.2. The Network Structure Is Weak, And There Is A Big Difference Between the Urban Network and The Rural Network

The distribution network structure in my country is still unbalanced. In some underdeveloped areas, remote mountainous areas and economically underdeveloped areas in the west, the network structure is weak and the network signal is poor. In addition, the gap between urban power grids and some rural power grids is still obvious. Urban power grids are perfect and stable, while some rural power grids are still unstable.

3.3. Low Coverage of Distribution Automation

China's vast territory, wide in distribution network not only, and larger scale, compared with the entire distribution system, has built the automation of power distribution coverage ratio is too low, can't show the scale effect, to a great extent had a certain influence on the power distribution automation, also affect the reliability of power supply, namely scientific management contribution degree of the distribution network.

3.4. Problems in Information Interaction and Application

First, the effect of information interaction is poor. For the information exchange between buses and systems in some areas, the positioning effect in terms of management responsibilities is ambiguous, and the dispatching department and the communication department are divided, and there is a phenomenon of unmanned maintenance of the bus. If the interface data anomalies are not found in time, it will be very difficult to put them into practice. Secondly, there are very few bus information interaction business applications, only GIS applications are relatively mature, and the abnormal distribution network pattern results in extremely low use efficiency of the information interaction bus, and the application effect is not obvious.

3.5. Security Challenges

The intelligent power distribution big data is based on the cloud computing platform. The open environment, users, customers, and monitors of the platform are the sources of data. Once the data is attacked by hackers, resulting in data leakage, it will cause a huge blow to enterprises and power grid companies. User information leakage will also be detrimental to national security. Therefore, the application technology of intelligent power distribution big data is facing the challenge of network security. Only by doing a good job in network information security, strengthening the defense against hackers, and providing the ability of security defense, can the big data application technology of intelligent power distribution network be developed and successfully applied. In the user life and power grid management development planning.

4. Prospect Analysis of Big Data Application Technology in Intelligent Distribution Network

4.1. Distribution Terminals Are More Standardized

The standardization of power distribution terminals is mainly based on the standardization of power modules, standardization of communication templates, standardization of communication defaults, and standardization of terminal operation and maintenance.

4.2. The Flexibility and Adaptability of The Power Grid Have Been Enhanced

Smart grid needs continuous development. Multiple failures may occur under extreme events. Therefore, appropriate defense measures should be taken. Therefore, it is necessary to further explore the rapid recovery technology on the basis of the existing fault self-healing intelligent distribution website, in order to enhance the flexibility and adaptability of the power grid, combine it with the flexibility

of the power grid, improve the distribution network system, secondary equipment and software control, in order to greatly enhance the flexibility and adaptability of the power grid.

4.3. The Pattern of Electric Power Development Has Been Transformed

Need to change the extensive industrial development mode, the power industry, too, need to transformation and upgrading, optimizing production operation mode, to achieve the goal of energy conservation and emissions reduction, by energy intensive, high emission and low efficiency of the extensive development mode to the low energy, low emission, high efficiency of green development mode change, to adapt to the national development plans, Participate in the governance and resolution of global environmental issues.

4.4. Operational Efficiency Is Improved and Customer Experience Is Improved

Big data technology can more conveniently collect and process customer information, improve the operation efficiency of electric power enterprises and improve customer experience. Operating benefits mainly include: Profit guarantee, network management, product management, asset management, demand forecasting and support function optimization, etc., under the big data based on operating inefficiencies Timely find the reason, to find the operating efficiency is a key link in the process of ascension, the real starting from the point of improving operation efficiency, reduce the cost of operation and maintenance management of unnecessary spending. At the same time, relying on big data technology to collect customer feedback can better improve customer experience and provide customers with better quality and more efficient services.

4.5. The Platform Construction Is More Perfect

With the development of time and continuous investment in human and material resources, the construction of the power grid big data integration platform will be more complete, open, transparent and efficient step by step, and the integration of various data resources will also be more complete. At the same time, relying on this platform to expand and cover other fields of power grid planning, the barriers at all levels and links will be broken, unnecessary links will be omitted, and a complete power grid big data platform will eventually be formed.

4.6. The Data Collection Process Is More Streamlined and Simplified

Relying on the big data platform, the data collection efficiency of the power grid will be greatly improved. At the same time, it will reduce the labor cost of data collection, reduce the burden of manual data collection, improve the reliability, feasibility and practicality of data, help to save money and manpower investment in data collection, invest more energy in the development and application of science and technology, and improve the work efficiency of the power grid. At the same time, Use the data accurately to improve the construction and service of the power grid, increase the benefits of the power grid, and obtain good returns.

4.7. Full Information Management of Data Results

Relying on the big data platform, centralized management and maintenance of the data in power grid planning is carried out to ensure the high transparency of data information. The data results are managed by relevant professionals, which is efficient and convenient. The management will be systematic and efficient, which greatly saves costs and improves the efficiency of information management.

5. Conclusion

The integration of intelligent distribution network and big data technology, carrying big data platform, relying on science and technology and information technology, has broad development prospects and future, innovating user services, improving user experience, and ensuring the convenience and efficiency of the power grid. However, at the same time, we should pay attention to network security, strengthen the development and progress of network security related technologies, prevent hacker attacks, avoid unnecessary losses, and maintain the information security of the network.

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