

Discussion on the Design and Implementation of Transmission Line on-Line Monitoring System

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Abstract: Along with rapid development of science and technology, using digital technology to further enhance the level of the safe and stable operation of transmission lines, become the important problem urgently to be solved in development process of transmission lines, especially for empty area, no signal coverage area of transmission line operation operation condition for real-time monitoring and control, became the top priority of intelligent transmission line, So it is imperative to construct transmission line on-line detection system.

1. Introduction

Is the fast rise in number of transmission line equipment, frequent occurrence of extreme weather problems, repair transmission line task increases year by year, and intelligent monitoring and early warning service system is not mature, the present stage is an urgent need to use the corresponding technology to build a transmission line and warning service network system, to enhance the capacity of transmission line of natural disaster emergency disposal, All kinds of disasters and accidents on transmission lines have been effectively eliminated to ensure the continuous and stable operation of transmission lines.

2. Tthe Implementation of Power System Transmission Line Monitoring Importance

The power system involves power generation, transmission, transformation and distribution, etc. Ensuring the continuous, stable and safe operation of transmission lines is an important prerequisite to ensure the smooth development of the above work. Work practice, however, because the transmission line has a long transmission distance, layout, a wide range, bearing a long transmission distance, layout, a wide range, bearing diversification of electricity demand at the same time, the environment is very complex, so the existence of interference factors, especially the wind, thunderstorms, earthquakes, floods and other natural disasters occur frequently, poses a great disturbance, the continuous and stable operation for transmission line damage to transmission line, Cause transmission line security problems occur. In particular, transmission line dancing is the most typical problem. Affected by strong wind and cold factors, line dancing will have a lot of mechanical vibration energy, which will not only endanger the safety of the line itself, but also lead to the fracture of the line under heavy load, and will impact, ftings, insulators and towers, causing fatigue damage. In addition, China presents a very uneven distribution in electricity consumption, different regions have different power consumption, there are very different peak periods, the power system is facing huge power pressure, if there is a line fault, it is easy to affect the power supply safety of the power system. In this context, the power system transmission line monitoring, inspection work is more important. By closely_ monitoring the actual operation of transmission lines, line faults can be timely understood and mastered, which is convenient for the staff to carry out maintenance, which can avoid further serious transmission line problems to the greatest extent, reduce the probability of accidents and ensure the safety of daily electricity consumption. ^[1]

3. Practical Advantages of Transmission Line Online Monitoring System

3.1 Enrich the Theory of Transmission Line Intelligence

The research of this topic involves the electric power industry, which belongs to the national key strategic security field. It directly affects the safety of China's electric power industry and provides practical guarantee for China's production and construction and people's quality of life. Transmission line online monitoring industry is an important part of intelligent transmission lines, and also the basic guarantee of power Internet of Things construction. The realization of this project will help promote the development of intelligent transmission lines, thus driving the development of the entire industry, and promoting the gradual realization of digital transmission lines and intelligent modern management in China.

3.2 Reduce the Accident Rate

As the collapse of the transmission pole is uncertain, it will lead to large-scale power failure of the city power supply system, which will have an impact on the economy and society. For example, the failure of a 500KV transmission line with 400MW power will cause an economic loss of 1.2 million yuan within 60 minutes. The transmission line intelligent monitoring system can effectively reduce the occurrence of snow, ice and other disasters. When the line is covered with ice, the system can be used to transmit the scene ice video, and provide technical support for the line's emergency repair during the ice cover period.

3.3 Improve Intelligent Management

Use of transmission line on-line monitoring system, can effectively solve the unstable wireless link transmission, power supply system is disorder, image transmission problems such as unclear and equipment maintenance workload big, effectively solve the limitations of the traditional model monitoring, implementation of each signal line corridors environment, real-time monitoring of ice, weather conditions, Strengthen the status detection between the icing period and key lines, so as to continuously improve the level of intelligent management.

3.4 Provide Technical Wood Support

The on-line monitoring system of transmission line can monitor the ice condition, weather condition and tower inclination of transmission line, and transmit high-definition video of monitoring area. Power transmission line maintenance personnel in the office can use the background client system to access real-time on-site monitoring data and high-definition video, master the running status of the field line, as if in person. Local site in danger or in the future when we have a wide range of natural disasters system for the first time to the client software, mobile phone WeChat and a variety of ways to line operations staff to send warning information, to a great extent improve the transmission line maintenance staff's response to natural disasters and disposal ability, so as to eliminate the transmission lines accidents in the bud, minimize the accident loss.^[2]

4. Design and Implementation of Transmission Line Online Monitoring System

Transmission line on-line monitoring technology, namely to introduce various advanced monitoring method, designed a reliable on-line monitoring system for transmission line, the transmission lines to real-time dynamic monitoring, real time control of the transmission line current security technical personnel can running status, and effectively find and solve all the problems, to promote a safe and orderly operation of the transmission line. The basic structure of transmission line condition monitoring system mainly consists of state acquisition terminal, state information transmission network and monitoring center.

4.1 Overall System Architecture

In order to make good use of the power supply enterprise original investment and construction achievements, cut the original transformation cost of system access, and then complete the reasonable cohesion, a new transmission line on-line monitoring system as far as possible, relying on the original system than the upper part of centralized access technology, beginning in the system

construction and maintain system running a cost as small as possible. According to relevant industry norms and standards, the overall architecture of the system is divided into three levels: device layer, access layer and master station layer. At the same time, the system is divided into three subsystems: CMA client, CAG client and master station system according to different functions, according to the demand of transmission line status monitoring and system information organization mode.

4.2 Data Channel Construction

Because the setting environment of transmission line online monitoring system is harsh, and the distribution range is wide and the number is large, how to ensure the orderly transmission of monitoring data is an important issue to be solved in the system construction. At present, there is no ready-made communication system suitable for the collection and transmission of monitoring data. Even though a large number of technologies can be used to achieve data transmission, there are still some technical links to be improved. Nowadays, the communication technology that can be introduced is especially rich. Based on this, we should promote the construction of the data channel of the transmission line online monitoring device and the data channel of the transmission line online monitoring system according to the actual situation of the device and network resources. The transmission line online monitoring system transmits monitoring data to CMA in different regions by wireless communication. CMA completes data transmission through the data network access point and the master station system CMAIP.^[3] The status monitoring master station system interacts with the information access network shutdown based on the data network. The status monitoring master station system functions to receive and analyze the monitoring data transmitted by CMA, and assist in completing the control instructions issued by the master station system to the monitoring device.

4.3 Construction of Master Station System

4.3.1 Hardware Structure of the Master Station System

The hardware of the transmission line on-line monitoring master station is mainly composed of database server and application server. Run the client layer in the operator workstation, and realize the basic information management, status warning and other functions at the same time; The main station system of transmission line online monitoring is connected with CMA and online monitoring device based on firewall and gateway machine, so as to realize monitoring data interaction.

4.3.2 Software Structure of Master Station System

According to the function design of the transmission line on-line monitoring master station system, the software structure of the master station system is divided into three layers: client layer, Web server layer and database server layer. Among them, the client layer is mainly composed of browser module, and most of the system operations are carried out in this module. Users with different operation permissions can obtain different corresponding functions. The Web server layer is mainly composed of Web server, data access, WCF basic communication module, etc. The Web server can realize data query and management functions, and provide information basis for the client layer. WCF basic communication module can provide basic communication function for Web server. Database server layer is mainly composed of authority control, system structure, database, etc. Authority control can realize the setting of user authority. The system structure can realize the description of business logic by computer programming language. The database can realize the storage of a series of data required by the system.^[4]

4.3.3 Functional Structure of the Master Station System

The transmission line online monitoring master station system, as a comprehensive display, analysis and monitoring platform of online monitoring data, can realize the monitoring data presentation, statistical analysis, stability judgment and other functions. In order to ensure the monitoring data analysis level and practicability of the master station system, the master station system should be improved and perfected during the later operation to promote the optimization

and integration of original functions and the enrichment and expansion of new functions.

5. Conclusion

To sum up, the safety and stability of transmission lines plays a very important role in the power system, which effectively ensures the realization of the power system function and provides people with a more secure and stable power supply. Therefore, it is necessary to do a good job in the monitoring and inspection of power transmission lines in the power system, combined with the actual situation to do a good job in the application of detection and inspection methods, so as to effectively ensure the transmission stability of power transmission system, and provide a strong guarantee for the safety of electricity production and life.

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