

INVESTIGATION OF POWER QUALITY ONLINE MONITORING SYSTEM OF GUANGZHOU ELECTRICITY GRID IN CHINA

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ABSTRACT

This article describes solutions to the problems that appeared in the development process of the construction power quality monitoring system. The system based on integrated data platform and its advanced applications such as regional power quality assessment and Staining, association of transient event and fault information, data correction were proposed. Finally, Operation Practice and many cases verify that the system is effective and reliable.

INTRODUCTION

Power quality problem has now become the outstanding problems facing the power grid enterprises. Guangzhou Power Supply Bureau is also deeply concerned about the power quality and its technical supervision.

Since 2005, it began to carry out the field test of harmonic, accumulating large amounts of data; and online power quality monitoring system has been built since 2008. So far, Guangzhou has 337 online power quality monitoring devices in 80 substations. In the process of building active, on-line monitoring system had continuous improvement. In this paper, the characteristics and application of the system will be introduced.

PROBLEMS IN THE CONSTRUCTION OF POWER QUALITY MONITORING SYSTEM

With the construction of the system, some of the problems exposed while its scale in the rapid development. To sum up, there are three problems need to be solved:

1) Guangzhou online power quality monitoring system including two subsystems from different manufacturers. 257 of 337 monitoring points comes from one manufacturer, and the rest with its hardware and software comes from another manufacturer. there is a problem of information exchange. It's difficult for centralized data management and analysis. And with the constant building, the problem is more prominent;

2) power quality system exists the problem of information silos, unable to interact effectively with other information systems such as SCADA, EMS. etc. [1-4]

3) power quality monitoring system covers a wider

scope, involving a large number of monitoring data collection, statistics, analysis, coupled with knowledge of the field of power quality standards are constantly changing, it need to achieve effective assessment of the Guangzhou power quality status but also the effectiveness of the system construction and sustainable development, advanced application technology research-based power quality monitoring system. [5,6]

MONITORING SYSTEM BASED ON A COMPREHENSIVE DATA PLATFORM R & D

To solve the above problem, Guangzhou has developed a new set of power quality data platform

The construction of a comprehensive data platform

Universal data interface based on PQDIF has been developed to realize the sharing of power quality monitoring data from different monitoring systems. a cross-platform online power quality monitoring system was constituted;

the system designed the standardized storage method of various power quality data such as voltage deviation, frequency deviation, three-phase unbalanced, voltage flicker, voltage dips, liter and short interruptions, Etc.

Data interface of Quasi-real-time data platform to online power quality monitoring system was developed. the system could access to the relevant data from the SCADA system. it solved the problem of information silos of power quality monitoring system, and greatly enriched power quality data sources.

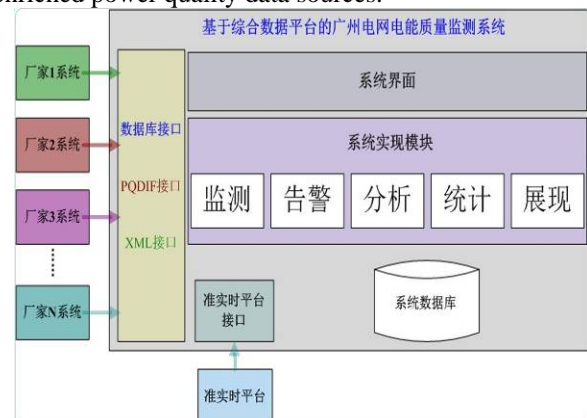


Figure 2.1 System Structure

The development of advanced applications

regional power quality assessment and staining

The theory of power quality regional assessment was studied, and applied to Guangzhou grid. it has been achieved visualization of power quality assessment based on geographic area separations display technology.

A simple and practical empowerment method was adopt in assessing the regional power quality,which by average empowering to determine the weight of each index, bus bar and substations in the region[14-16].

The results of the assessment can query in power quality monitoring system. By dying in the geographical map of Guangzhou, the results of the assessment is more intuitive.



Figure 2-2 Regional Assessment of total harmonic voltage distortion rate

As shown above, the green part of the assessment results good in the region have not exceeded the phenomenon, the orange area represents the area occasionally exceeded the phenomenon, so as other power quality indicators.

2.2.2, quasi-real-time platform, transient events with grid failure associated

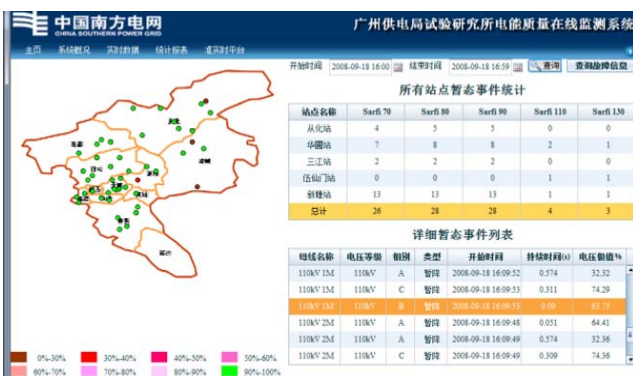


Figure 2-3 finding transient events from grid failure



Figure 2-4 finding grid failure from transient events

A lot of power quality transient events (such as voltage dips and liter) is triggered by the grid fault. To fuzzy matches using the SCADA platforms scheduling information, the power quality transient events with the grid fault interrelated, it's easy to analyze power quality problems and failures affect.

When transient event information found in the transient event management module of the system(Fig 2.3), we can query fault information in Fig 2.4 module by time matching link.Similarly, from the failure information links can also query the information of the power quality.

POWER QUALITY ONLINE MONITORING SYSTEM APPLICATION

On November 7, the transient event management module of power quality online monitoring system had found a large number of transient events in different monitoring points.

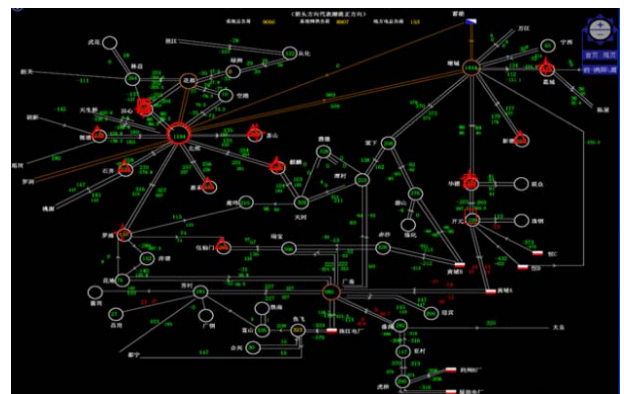


Figure 3-1 Quasi-real-time data interface

Associated with the fault management module through this system, we could query scheduling platform fault records: November 7, 2010 13:10, one 500kV transmission line fault. its main protection action, both sides of the C phase breaker trip and coincides unsuccessful.

This failure caused some monitoring point voltage dips and liter. The scope of its influence spread to 23

substations, involving all voltage levels from 500kV to 10kV, especially the greatest impact on the low voltage of 110kV, 10kV distribution network.

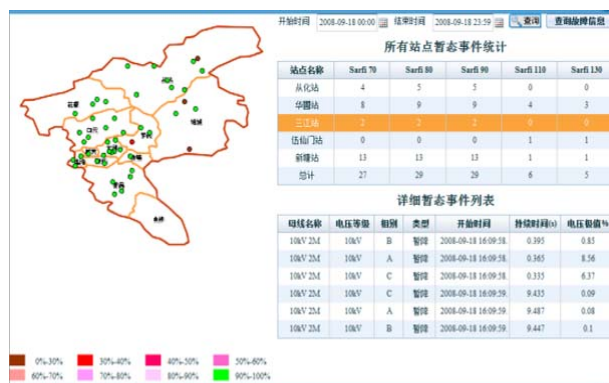


Figure 3-2 Transient event statistics icon

This system provides a large number of meaningful data, which can be used to in-depth study of this failure.

To study the amplitude of voltage dips, generally follow the law that farther away from the point of failure, the amplitude smaller, However, a small number of monitoring points appears that the amplitude of voltage dips of monitoring point is larger than the original point of failure.

To study the duration, due to the perfect relay protection, the duration of voltage dips are generally less than 2-3 cycles. But a few bus appears longer duration, which need further in-depth study of the mechanism of its occurrence.

CONCLUSION

This article describes the problems of Guangzhou power quality monitoring system in the development, Such as difficult for different manufacturers to interact, information silos and urgent need for regional power quality assessment.

Guangzhou Power Supply Bureau developed the system based on the original. to solve these problems on two fronts. Firstly, build a cross-manufacturer, cross-platform monitoring system by developing universal data interface. On the other hand, advanced applications, including regional power quality assessment and dyeing, transient event and fault information correlation, was evaluation of research and applied in power quality analysis and evaluation.

In the future, we will research and develop more advanced applications according to the actual needs, make full use of the power quality monitoring system, and provide better services to enhance the Guangzhou grid power quality level.

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