The Necessity of Information Communication Equipment Status Evaluation

Jinxiong Zhao[1, a], Zhili Ma[2], Zhihang Luo[2], Zhiru Li[1], Yong Zhi[1]

[1]Grid Technology Center, State Grid Gansu Electric Power Research Institute, Lanzhou 730070, China;

[2]State Grid Gansu Electric Power Supply Company, Lanzhou 730030, China.

[a]18352449382@163.com

Abstract. The aging trend of information communication equipment is obvious and the safe and stable operation is facing great challenges. It is urgent to establish an information communication equipment status evaluation system, improve the quality control level of information communication equipment, and consolidate the essential security foundation. Therefore, the status evaluation of information communication equipment is the first step of the overall plan.

Keywords: equipment status, necessity, evaluation.

1. Introduction

In order to meet the challenges faced by the aging of information and communication equipment and the safe operation of the company [1-2], new requirements on equipment quality control were implemented. Centering on the goal of "improve equipment quality, select good equipment", it is more necessary to establish and perfect the status evaluation system of information and communication equipment [3-4], and to deepen the test and detection, status evaluation, technical supervision and research of information and communication equipment. The quality evaluation means and equipment quality closed-loop management mechanism should be further improved thoroughly, the quality foundation of information and communication equipment should be strengthened comprehensively, the "essential safety" of equipment should be closed, and the company's information and communication system should be guaranteed to operate safely and reliably.

2. Necessity of Evaluation

Since 2015, China academy of electrical engineering has conducted a comprehensive survey and analysis on the reliability of the information and communication equipment operated by the company in accordance with the technical service requirements of the headquarters. It has sorted out over 300,000 equipment books and fault information, and concluded that the current status of the company's information and communication equipment is summarized as follows.

2.1 Large Equipment Base.

The equipment base for more than 5 years is large and the growth rate is high. From 2015 to 2017, the company increased 13,464 devices in operation, with a growth rate of 12.09%.Among them, the cumulative increase of 24,909 devices that have been running for more than 5 years is 48.62%, the growth rate of equipment that has been running for more than 5 years is higher than the total growth rate of equipment, and the proportion of equipment that has been running for more than 5 years has increased from 46.01% to 61%.

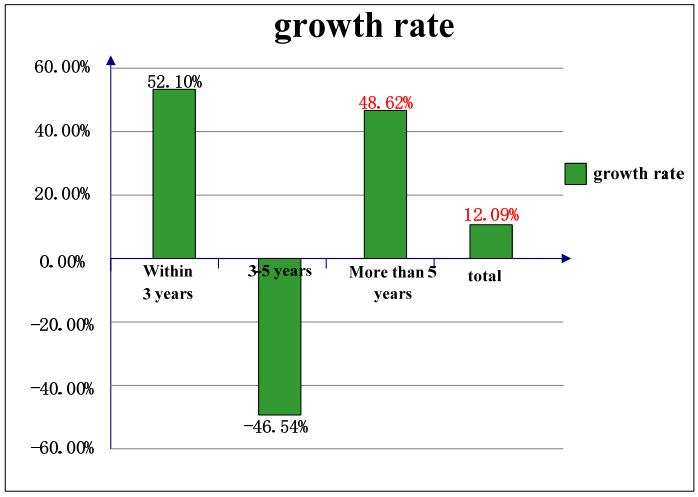

Fig. 1 Cumulative Equipment Growth Rate

The equipment failure rate is the highest after 5 years of operation. The number of equipment faults over 5 years is 76%.

Table 1. Equipment Failure Rate

types of failure	Number of information equipment failures in 2017(times)			The total number of failures
	Within 3 years	3-5 years	More than 5 years	
Host	217	439	1516	2,172
Storage and backup	76	188	1477	1,741
Network	37	50	193	280
security	7	10	50	67
Total	337	687	3236	4260

2.2 Offline Equipment Status.

The equipment was not offline in time. Some "old" information system load equipment did not get offline in time, and the offline equipment did not get out in time. In 2017, the headquarter conducted a total of 3,814 sets of information systems, and sorted out 4,680 sets of "old" information equipment. A total of 825 sets of offline information system equipment were found to be still in operation in 32 units, and 39 units failed to enter the warehouse in time after the power was cut off in 2012. To sum up, the aging trend of the company's information and communication equipment is obvious, and the safe and stable operation is facing great challenges. It is urgent to establish an information and communication equipment status evaluation system, improve the quality control level of information and communication equipment, and consolidate the essential security foundation.

3. Assessment Rules

3.1 Spectrum of Duties.

Quality supervision: under the guidance of the information and communication department of state grid, carry out the company's information and communication equipment testing, status evaluation, technical supervision, product certification and other work to strengthen the quality supervision of the whole life cycle of equipment.

Professional analysis: responsible for carrying out professional analysis of information and communication equipment. Apply big data analysis, artificial intelligence and other technologies to carry out intelligent analysis on the data of information and communication equipment life cycle quality supervision, and provide basis for the company to formulate related management

specifications, technical standards and technical policies for information and communication equipment.

Technical research: to carry out the research and popularization of new technologies and methods in the test inspection, status assessment [5], and technical supervision of information and communication equipment.

Standard construction: under the guidance of the information and communication department of state grid, carry out the construction and verification of standards and systems related to the management standards and technical standards of information and communication equipment.

Training promotion: establish the company's information and communication equipment life-cycle quality supervision and sharing mechanism, realize equipment quality data sharing, as well as professional technology exchange, training and sharing.

3.2 Concrete Proposal.

The work of the information and communication equipment evaluation center is under the leadership of the information and communication department of state grid [6-7], led by the China academy of telecommunications, and jointly organized by various provincial and municipal companies (including provincial telecommunications institute, provincial telecommunications company) and state grid communications company. The organization chart is shown on the right.

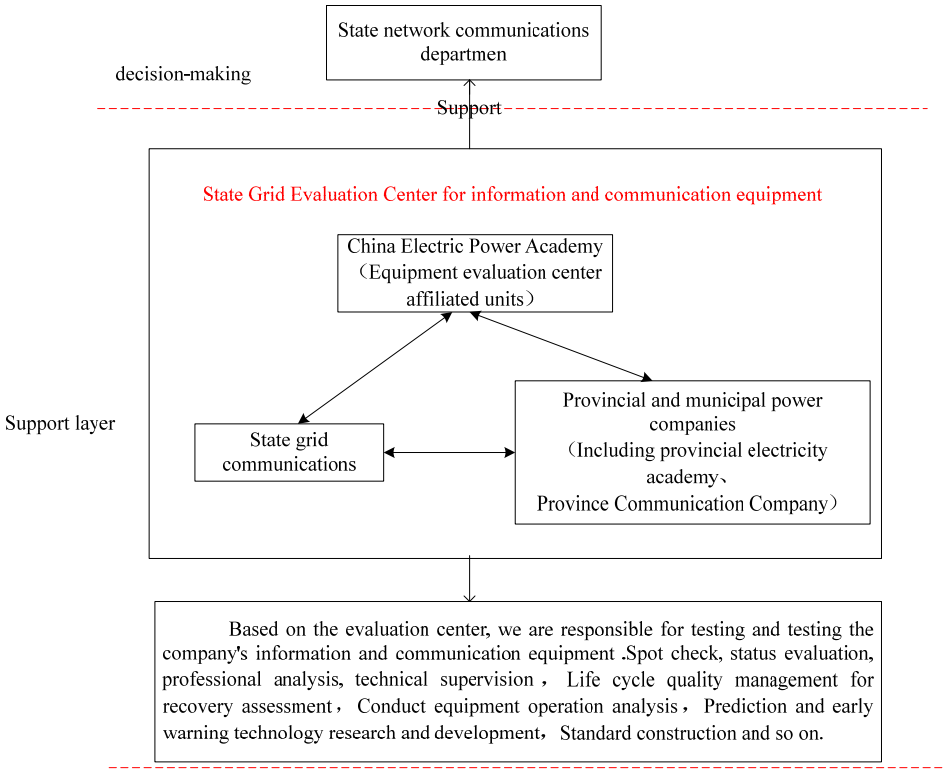

Fig. 2 Organizational Construction Structure

3.3 Business Planning.

Through infrastructure capacity building, management capacity building and technical capacity building, the evaluation center fully supports the headquarters to carry out the life-cycle control of information and communication equipment.

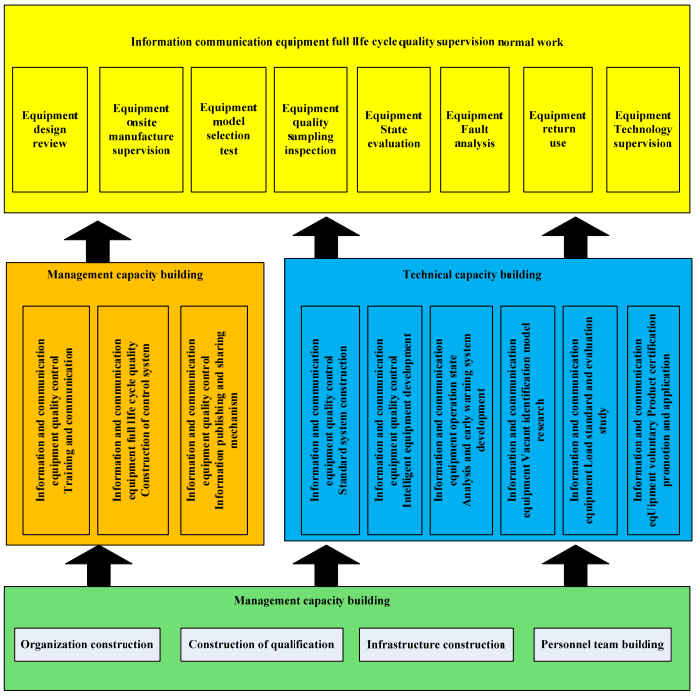

Fig. 3 Overall Planning Framework

3.4 Business Planning.

(1) Test detection: deepening the network access (type selection) testing and quality sampling inspection of information and communication equipment, gradually changing from passive detection and prevention mode to active inspection and accountability mode, promoting suppliers to improve responsibility awareness, ensuring product quality and good faith performance service. Organize and carry out special detection for the information and communication equipment with abnormal data, bad working condition and failure occurring in the on-line monitoring or operation testing of the equipment.

(2) Condition Assessment: the state evaluation and reliability analysis model of equipment construction is studied, the technical support module is developed, the state evaluation and reliability analysis of the company's information communication equipment is carried out regularly every year, the archives and typical case database of equipment state evaluation are established [8-9], and the collection, analysis, sharing and release of equipment information is realized.

4. Summary

In a word, through the evaluation of information and communications equipment, can establish and improve the state of information and communications equipment evaluation system, deepen the information communication equipment test, state evaluation, technical supervision, technical research and so on each work, improve the quality of evaluation means and equipment quality closed-loop management mechanism, laying solid foundation information communication equipment quality in an all-round way.

Acknowledgements

This work was supported by the National Natural Science Foundation of China (61762058) and State Grid Science and Technology Projects (522722180007).

References

[1]. Nihal Menzi Çetin, Buket Akkoyunlu. A Study on How to Equip Students with Scientific Communication Skills. Information Literacy in the Workplace. Vol.810 (2018), p. 389-397.

[2]. Ewa Soja. Information and Communication Technology in Active and Healthy Ageing: Exploring Risks from Multi-generation Perspective. Information Systems Management. Vol.34 (2017) No. 4, p. 320-332.

[3]. Slavisa Aleksic, Vedad Mujan. Exergy cost of information and communication equipment for smart metering and smart grids. Sustainable Energy, Grids and Networks. Vol.14 (2018), p. 1-11.

[4]. Insoo Kim, Kyungsu Kim, Hye-Seon Chae, Hyo-Cher Kim, Kyung-Ran Kim. Analysis of Patent Trends in Industrial Information and Communication Technology Convergence: Personal Protection and Convenience Equipment Applicable to Agriculture. The Korean Journal of Community Living Science. Vol.28 (2017) No. 3, p. 377-390.

[5]. M Fois, A Cuena-Lombraña, G Fenu, D Cogoni, G Bacchetta. The reliability of conservation status assessments at regional level: Past, present and future perspectives on Gentiana lutea L. ssp. lutea in Sardinia. Journal for Nature Conservation. Vol.33 (2016), p. 1-9.

[6]. Claudio Fiandrino, Dzmitry Kliazovich, Pascal Bouvry. Performance and Energy Efficiency Metrics for Communication Systems of Cloud Computing Data Centers. IEEE Transactions on Cloud Computing. Vol.5 (2017) No. 4, p. 738-750.

[7]. Pietro Ruiu, Claudio Fiandrino, Paolo Giaccone, Andrea Bianco, Dzmitry Kliazovich, Pascal Bouvry. On the Energy-Proportionality of Data Center Networks. IEEE Transactions on Sustainable Computing. Vol.2 (2017) No. 2, p. 197-210.

[8]. Wang Haoming, Tang Chong, Wu Liping, Yang Lei, Yao Ying, Liu Hong. Dynamic Reliability Assessment of Distribution Network Based on Equipment State Evaluation Model. Proceedings of the CSU-EPSA. Vol.29 (2017) No. 7, p. 68-74.

[9]. Nicolae Mărăşescu. EQUIPMENTS STATE EVALUATION USING FUZZY METHODS. IAnnals of Dunarea de Jos. Vol.38 (2015) No. 1, p. 23-26.