Postprint: Development Strategies for the Construction of Cable Television Network Resource Management Systems

Authors: Yao Gang

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Abstract

Since the beginning of the 21st century, the development of science and technology has promoted the integration of cable television construction and network technology, making cable television network resource management a new development trend. In this new development stage, research on the construction of cable television network resource management systems helps to enhance the scientific nature and rationality of construction, thereby promoting the healthy development of cable television system construction.

Full Text

Technology and Applications Research

Construction and Development Strategies for Cable Television Network Resource Management Systems

Abstract: Since the beginning of the 21st century, scientific and technological advancements have propelled the integration of cable television construction and network technologies, making cable television network resource management a new development trend. In this new development stage, researching the construction of cable television network resource management systems can enhance the scientific rationality of such construction and promote the healthy development of cable television system building.

Keywords: cable television; network resources; management system construction; development strategies

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By Yao Gang

Driven by computer technology, network technology, and cable television technology, the coverage area of cable television network resources in urban and rural businesses has continuously expanded. Consequently, the types of network resources have increased simultaneously, user numbers have grown steadily, and service varieties have shown a trend of diversification. Traditional systems and management methods can no longer meet current development needs. For instance, line management, user management, and system fault troubleshooting require more flexible, intuitive, and convenient network management systems to gain a clear understanding of network geographical distribution and attribute information. This facilitates effective network design on electronic maps, timely troubleshooting of various equipment failures, and thereby promotes the proper planning, management, and operation of cable television network systems.

1. Construction Objectives of the Resource Management System

In the new development stage, the development of cable television is inseparable from GIS technology. In constructing cable television network resource management systems, the main components encompass physical resources, spatial resources, and logical resources, which constitute important prerequisites for achieving network resource management. Through resource management, the cable television system can be provided with functions such as resource planning, fault analysis, and resource cutover and scheduling. Utilizing auxiliary design for optical cable and cable network planning improves management measures and enables rapid development of both cable television network resource management functions and basic network design. In constructing cable television network resource management systems, emphasis should be placed on equipment room construction, full utilization of GIS technology, promotion of coordinated development between design and management systems, and laying a solid foundation for the dynamic development of network resource management.

2. Basic Functions

The most fundamental cable television network resources are infrastructure constructed by the government, covering multiple residential areas, commercial districts, and office zones. These include supporting pipelines, poles, backbone optical cable networks, metropolitan optical cable networks, customer premises optical cable networks, cable networks, various inter-network equipment, devices, transmission rooms, and other physical media. Since network resources generally do not permit redundant construction, basic network resources possess certain exclusive characteristics once constructed, laying the foundation for various operational activities. In an increasingly competitive market, the importance of basic network infrastructure gradually becomes apparent. When

constructing cable television network resource management systems, attention should be paid to the effectiveness of basic resource management while including statistical analysis functions. In terms of basic functions, considerations should primarily focus on the following four aspects:

First, management functions. Management functions mainly include two aspects: unity and whole-process characteristics. Regarding unity, the establishment of a management platform should emphasize standardization to achieve coordinated management of physical and logical resources in cable networks. Regarding whole-process characteristics, network management should consider the entire lifecycle from procurement, warehousing, installation, debugging, maintenance, to scrapping, while also emphasizing comprehensive management from the perspectives of network resource planning and design, implementation phases, and post-operation.

Second, statistical query functions. These functions should be considered from two aspects. On one hand, it is necessary to query the existence of network resources. Based on the actual attributes of cable television network resources, such as pipelines, lines, and various components, these data models should be uniformly numbered and named to form a relatively complete resource mapping. This approach enables multi-attribute query functions for cable network resources. On the other hand, it addresses the availability of network resources. By tightly integrating the network resource system with business systems, effective interaction of information resources can be promoted. For example, marketing departments can clarify the quantity of sales resources they possess, maintenance departments can identify resources requiring priority maintenance, and decision-making departments can determine resources that should be prioritized for development. This facilitates dynamic resource allocation and timely strategic adjustments according to actual needs.

Third, auxiliary network planning and construction functions. This aspect primarily involves determining system technical indicators to achieve automatic generation of theoretical technical parameters, such as system diagrams and topology maps. Through calculations of physical and logical resources, planning and design of auxiliary functions can be completed, mainly including optical node locations, cable routing, optical cable handover points, and transmission rooms. The auxiliary construction function is primarily manifested during the network implementation phase, analyzing design results to calculate basic materials required for projects. Through electronic work orders, material requisition, supplementation, and return can be managed, thereby promoting work efficiency, significantly reducing unreasonable material usage, alleviating inventory pressure, and facilitating the smooth progress of construction projects.

Finally, network resource fault analysis functions. Faults in network system operation are inevitable. In such cases, it is necessary to promptly analyze fault points and utilize data to find appropriate emergency repair methods. By monitoring daily operational data of network equipment and analyzing relevant historical parameter records, reliable predictions can be made regarding

fault-prone points in long-used equipment, enabling the formulation of targeted preventive measures. Additionally, through analysis and statistics of operational faults across the entire network, quantitative performance analysis and evaluation strategies can be proposed for equipment and network operation.

3.1 Network Resource Census

The construction of cable television network resource management systems is a long-term project involving various issues, with network census and data entry serving as key factors that need to be completed before system design. This provides a basic survey of network resource types, scale, quantity, and usage conditions. Typically, network resources with strong representativeness are selected as census pilots to gain adequate understanding of census work in terms of equipment and costs, coordinate division of labor, effectively utilize internal company functions, and promote the scientific reliability of cable television network resource census.

3.2 Construction Scale and Timeline

Before system design, full consideration should be given to the construction cycle. Network resource management involves numerous departments, requires a long construction period, and demands large amounts of information. During system development, comprehensive research should be conducted to demonstrate system construction feasibility. System construction varies in scale, quantity, and complexity, and therefore should be completed in phases during the construction process. This maximizes resource management utilization, accelerates system construction speed, identifies problems in system construction, finds timely solutions, continuously improves work methods, and ensures the system meets usage requirements.

3.3 Workflow Design

With the improvement of management levels in cable television network operation units, personnel division of labor has become more clearly defined, and workflow design has gradually been applied to network resource management systems. Unified planning should be conducted before system application, and the basic principle of "institutions first, then systems" should be followed during construction to ensure the system meets basic functional requirements and gradually forms standardized and institutionalized construction.

4. Post-Construction System Work

In the later stages of system construction, corresponding systems should be gradually improved with strict process enforcement. Meanwhile, the network resource management system should be upgraded and effectively interfaced with logistics systems, financial systems, and customer service systems according to

procedures. After network resource entry is completed, reasonable development and utilization of relevant auxiliary functions of the network resource management system should be carried out to provide effective assistance for company operations. When making changes to network resources, timely updates should be made according to actual conditions. By establishing professional management organizations, such as forming new management departments from personnel related to network construction project teams, this facilitates rational development and utilization of resources. For network resource management systems, multiple application software is often involved to handle relationships between relevant departments.

5. Factors Leading to System Construction Failure

With continuous scientific and technological development and attention from the Chinese government, the development and construction of network resource management systems by network companies nationwide have achieved rapid growth, with software services for network resource management systems increasing accordingly. The market has also seen solutions for application systems and broadcasting network resource management. When providing system solutions, software service providers typically base their work on a small number of customers, such as model definition, system construction, and functional design. Such products require consideration of numerous aspects, resulting in blurred system boundaries. Some service providers simply utilize GIS functions only to display network equipment on electronic maps. Different software service providers exhibit significant differences in product development and construction. Network companies must find suitable service providers based on their own basic platform characteristics and system construction requirements. In actual cable television resource management system construction, there have been many failure cases. Based on information gathered, the author summarizes these reasons, which mainly include the following aspects:

(1) In the initial stage after system construction, due to slow resource data updates, some application departments began to question the reliability of system data resources, gradually abandoning use after obtaining several significantly erroneous parameters.

(2) In the initial stage of system construction, due to incomplete parameter construction and low service provider professionalism, the post-construction system effects were impacted, negatively affecting comprehensive usage.

(3) In the process of network resource management, network companies lack long-term development goals, creating a gap between system design and actual usage, resulting in poor system integrity that affects normal connection and usage of functional modules, ultimately leading to system idleness.

(4) Network resource management system construction requires substantial

funding, and some network companies lack reliable funding sources. Funding chain interruptions during construction are common, forcing construction to stop.

(5) Network companies fail to recognize the significance of network census and data entry for system construction, with relatively casual preliminary work resulting in insufficient reliability of electronic data resource information. After system construction, system data faults occur, negatively impacting some departments and gradually causing loss of confidence in the system.

In summary, in the new development stage, effective utilization of network resource management systems facilitates the network-based development of cable television and enhances service levels, representing an important measure for management innovation. During system construction, it is necessary to analyze various existing problems, continuously summarize experiences, improve comprehensive effects of network system construction, provide reliable reference basis for the healthy development of cable television network resource management systems, continuously enhance network resource management effectiveness, and realize corporate economic benefits and social value.

References: [1] Fu Jia. Design of Cable Television Network Resource Management System Based on GIS Technology [J]. Heilongjiang Science and Technology Information, 2013(22): 46. [2] Wang Xin, Tian Wentao, Shi Hui. Analysis of Current Status and Architecture Design of Cable Network Resource Management System [J]. China Cable Television, 2013(11): 1239-1242. [3] Dai Ningyan. Construction and Implementation of Suzhou Cable Network Resource Management System Based on GIS Technology [J]. Radio & Television Technology, 2014, 41(11): 20-25. [4] Yi Xiuzhong, Chen Chao. Construction and Application of Network Resource Management System Under Triple Network Convergence [J]. Cable Television Technology, 2018. [5] Ren Ningning. Construction Planning of Cable Television Network Resource Management System [C]. Proceedings of the 2013 Academic Annual Meeting of the China News Technology Workers Association, the 5th 5th Council Meeting and the 6th "Wang Xuan News Science and Technology Award" and Excellent Paper Award Ceremony (Broadcasting Section), 2013. [6] Zhou Jianru. On the Application of GIS Technology in Cable Television and Its Online Management Functions [J]. China New Telecommunications, 2015.

(Author's affiliation: Jiangdu Branch, Jiangsu Cable Network Development Co., Ltd.)

Note: Figure translations are in progress. See original paper for figures.