



Analysis and Research of Computer Network Reliability Based on Intelligent Computing

Zhe Wang^{1,a}, Yun Wu^{2,b,*}, Qiandi Cheng^{3,c}, Hui Zhang^{4,d}

¹Department of general education courses, Nantong Health College of Jiangsu Province, Nantong, China

²Department of pharmacy, Nantong Health College of Jiangsu Province, Nantong, China

³Teaching and research group of mathematics, Nantong Bayi Primary School, Nantong, China

⁴Technical department, Qilu Pharmaceutical Co., Ltd, Jinan, China

^a86591811@qq.com

^{b*}Corresponding author: 419798861@qq.com

^c623458613@qq.com

^d18251376523@163.com

Abstract. Under the promotion of social economy, various advanced technologies have developed gradually, which means the era of intelligence has begun. A number of systems with intelligent characteristics can be applied to the improvement of computer network systems and then meet the development demands of the intelligent era. While grasping the direction of intelligent information construction, scientific goals can be set up to make the optimization of intelligent rights and interests become a new commanding point. Fully exploring the computer network reliability analysis under the form of intelligent computing can also identify the future development trend. By studying the computer network reliability, the important connection between the communication network and the computer management system is understood, and further the development level of the intelligent era is optimized.

Keywords: intelligent computing; computer network; reliability analysis specific strategy

1 Introduction

After entering the information society, the development trend of computer network is gradually known to people. It has been increasingly recognized that computer network systems, intelligent systems, etc. can be closely connected to optimize the reliability of computer networks in combination with the Internet and other related technical systems. The analysis of this reliability index is of great value ^[1]. In the process of researching the communication network and other contents, it is necessary to combine the air administration system, the transportation system and other related modules to more accurately and comprehensively analyze the application effect of multi-

ple terminals, so as to promote the reliable development of the computer network in the reliable research.

2 The theoretical overview of computer network reliability

For the network reliability analysis, in the process of continuous development, it can gradually penetrate into the transportation system and other related fields. Through the analysis of typical structures such as series and parallel, the basic requirements of large and complex systems are studied. Understanding the basic concepts and what-if analysis of computer networks can also help us correctly understand the basic requirements for numerical calculation of computer reliability. Generally speaking, the theoretical content is mainly shown as follows:

2.1 Conceptual Analysis of Computer Network Reliability

For a computer network system, it consists of two parts: nodes and arcs connecting nodes. In the process of specific analysis, nodes include three different types: input nodes, output nodes and intermediate nodes. In the process of exploring related issues, it is necessary to understand the basic forms of connection arcs such as input nodes and output nodes. While grasping any structure, it can fully improve the role of computer-aided analysis [2]. Generally speaking, in order to effectively simplify the problem, there are only two possible states of the system and operation. So it is either normal or not working. The faults of each arc are independent of each other, and the faults of any arc will not affect the normal operation of other arcs.

2.2 The influencing factors of computer network reliability

Next, Information system has surrounded all aspects of economic development and social life, and spread across various fields of development (see Figure 1). It is of great modern value to fully optimize the reliability analysis of computer networks between intelligent computing modes. In addition to understanding the basic concepts and assumptions, in-depth discussion of the factors affecting the reliability of computer networks is also very critical. First of all, user device related functions or computer network reports will be affected. In the application of intelligent computing, the network reliability is affected by the comprehensive routine maintenance of terminal devices and the strength of interaction capability. Secondly, from the perspective of transmission and switching equipment management, the practice process also affects the operation of computer network system. During the installation of transmission devices, it is generally necessary to use standardized communication lines and cabling systems to fully optimize the reliability of the network layout, and to use double lines and cabling to switch the network lines. The third factor is the scientific nature of management of network, which will also affect the completeness of information transmission [3]. Generally speaking, we should pay attention to the solution of problems such as information loss. Through the optimization of the information network

reliable system, the network parameters can be collected in real time to avoid external faults affecting the acquisition of relevant information. Last but not least, its main influencing factor is the perfection of the network topology. In the process of operation, the transmission medium is closely connected with each device. In the process of grasping the physical connection status of network devices, it is necessary to understand the network technology, network scale, transmission medium and other related influencing factors through the improvement of the planning structure, so as to grasp the basic content of network performance. For example, it is necessary to accurately measure relevant parameters such as limited fault tolerance and diameter limited connectivity, so as to make computer network planning more scientific.

The function of the computer network

- Data transmission
- Resource Sharing
- Increased reliability
- Improve system processing power

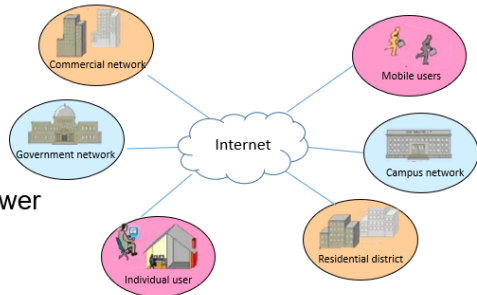


Fig. 1. The function of the computer network

2.3 Computing requirements for minimum subgrade of computer network system

In the process of combining the relevant functions of the computer, granular computing and other related methods should be applied to show the roughness and theory of interval analysis more accurately. The whole calculation work should be combined with the minimum set point traversal method in the traditional network system to accurately represent the two digits. When finding the next minimum set, the dynamic data is released comprehensively. At the same time, the dynamic array should be comprehensively layered with the method of intelligent force calculation and segmentation theory, so that the reliability of computer network system can be realized.

3 Strategy analysis of computer network reliability based on intelligent computing

According to the above content analysis and exploration, it can be seen that under the form of intelligent computing, the application of computer network and other related

systems to improve the reliability of network operation is of great value (see figure 2). It is necessary to fully understand the relevant factors affecting the reliability of computer network and strengthen the scientific control of various details. Through scientific network management, better reduce the external factors on the computer network reliability of the adverse impact, so that through the application of a variety of theoretical methods, make the overall operation management more scientific [4]. Generally speaking, in the process of showing specific strategies and other contents, we mainly elaborate the contents as follows.

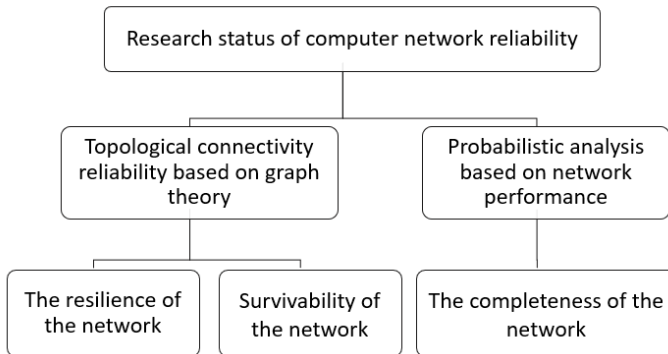


Fig. 2. Computer Network Reliability Research

3.1 Fully improve the scientific design of computer network hierarchy architecture

In the process of setting up the computer network system, more advanced and suitable network equipment should be equipped. In particular, the advanced nature of network hierarchy and architecture should be considered. Through the optimization of the architecture system, we can better understand the basic performance of the network equipment. The overall network hierarchy design should reflect the basic form of distributed network service. Through the design of scale high speed network layer, the glass model is comprehensively applied and expanded [5]. With the overall increase of network nodes in the future, the network capacity will be effectively expanded, and the daily operation and management requirements will be clarified.

3.2 Pay attention to the scientific realization of fault tolerance ability of computer network

Of course, it is very important to strengthen the fault-tolerant design of computer network system and analyze the specific guiding principles in detail. Generally speaking, it is necessary to comprehensively implement relevant principles such as parallel backbone and dual network center according to the specific needs of colleges and universities, and comprehensively demonstrate the following strategies: First of all, it

is necessary to better understand the basic requirements of user terminal equipment and server connection, actively connect them to the computer network center, and better grasp the management requirements of parallel computer network and redundant computer network center. Secondly, more accurate grasp of the wide area network within the scope of the data link and router connection of the basic requirements. Even if a fault occurs during data transmission, local network users are not affected. Thirdly, it is necessary to give full play to the advantages of hot swap and hot swap of network equipment and actively grasp the flexibility of networking mode. Without cutting off the power supply, timely understand the cause of the failure, reduce the scope of the failure, and further improve the relevant ability of the computer network for a long time. Finally, multiple processors should be used to improve the fault-tolerant ability through special design, and separate systems should be integrated into the overall fault-tolerant operation to make the function of network management software play more quickly.

3.3 Pay attention to the adoption and implementation of multiple redundancy strategies

In the process of optimizing and displaying the basic performance of computer network system, it is very important to take redundancy measures actively and improve the fault-tolerant design of computer network. Generally speaking, to make clear the basic requirements to reduce the failure time, understand the problems in computer network management, to avoid the actual measures to implement the process of data loss error or the whole system paralysis and other bad problems. For example, redundant users can be closely linked to the data link in the center of the computer network, so that the computer network is not affected by other failure factors (see figure 3).

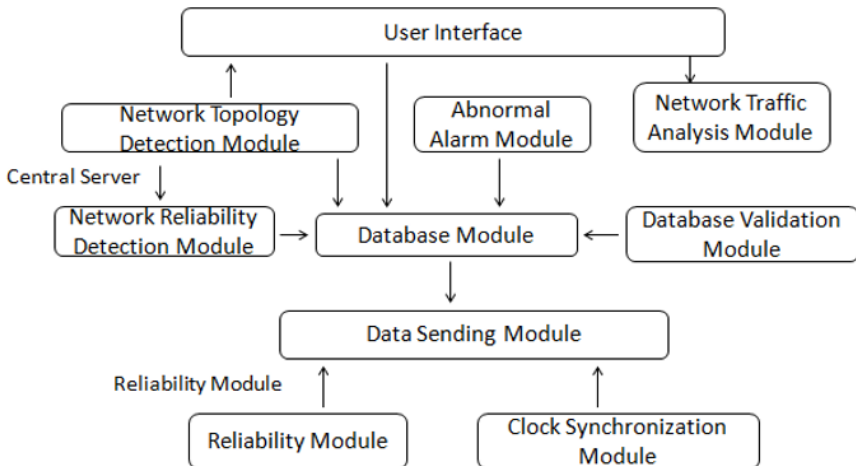


Fig. 3. The function broadcast of the computer network system

4 Changes in network reliability after specific strategies are applied to campus network systems

Through the analysis of the above strategies, we apply the scientifically designed computer network hierarchical structure and the system with improved fault tolerance to the campus network of our school. We have made detailed data records and statistics on the operating failures of the campus network system in the past two years (see table 1). From the statistics in the above table, it is not difficult to see that the numbers of campus network terminal equipment failures, server failures, network equipment failures, and network operation failures have gradually decreased since the first quarter of 2021. This shows that the overall reliability of the campus network is rising.

Table 1. Fault Statistics of Campus Network System after Intelligent Optimization

Fault Type	Subtype	Quarterly failures					
		2021				2022	
		Q1st	Q2nd	Q3rd	Q4th	Q1st	Q2nd
Terminal equipment failure	Host Motherboard Failure	8	6	7	5	4	1
	Host Graphics Card Failure	3	1	3	2	0	0
	Host Power Failure	8	8	7	6	3	2
	Host network card failure	3	3	0	2	0	0
	Display Circuit Failure	2	1	1	0	0	0
	OS issue	6	3	3	6	3	2
	System abnormality caused by viru	106	108	89	56	43	18
	Other hardware failure	18	16	8	3	2	1
	total	154	146	118	80	55	24
Server Failures	Server hard drive failure	1	2	1	1	1	0
	Server power failure	1	0	0	1	0	0
	Server network card failure	0	1	0	0	1	0
	OS issue	0	0	1	0	0	0
	System abnormality caused by viru	4	5	2	2	1	1
	Other hardware failure	4	1	1	0	0	0
	total	10	9	5	4	3	1
Network equipment failure	Switch CPU temperature is too high	1	1	1	0	0	0
	Switch port failure	6	6	8	6	4	1
	Switch power failure	1	0	1	0	0	0
	Optical module failure	0	1	0	0	0	0
	Ethernet board failure	0	1	1	0	0	0
		total	8	8	10	6	4
Network running fault	Switch configuration error	4	2	1	0	0	0
	Optical fiber line fault	4	2	1	0	0	0
	Optical stranded jumper fault	12	6	5	1	0	0
	PC configuration error	2	3	3	1	1	0
	Network congestion	3	3	2	1	1	2
		total	25	16	11	3	2

5 Conclusion

In the process of exploring the reliability of computer network system and other related issues, combined with the basic requirements of intelligent computing, the basic points in the operation of various system details are better explored. Through the analysis of dynamic data, the overall operation speed can be optimized, and the specific object segmentation theory method can be comprehensively applied while grasping the operation function. However, there are few studies on the evaluation methods of computer network reliability test results. The more commonly used method is the comprehensive evaluation to summarize various types of data. Specific methods include analytic hierarchy process, grey relational degree method, artificial neural network method, entropy weight method, etc. But these methods cannot provide quantitative evaluation results. Therefore, the evaluation method occupies a very important position in network reliability research, and it is also the direction and key point of future research.

Acknowledgment

First of all, I would like to thank the partners, Yun Wu, Qiandi Cheng, and Hui Zhang, who work hard with me day and night. They gave me meticulous care and help in work and life. In addition, I would like to thank my families and friends for their solid logistical support every day from morning to night.

References

1. Dong Z. (2017) Survey of computer network reliability research under intelligent computing [J]. *Software guide*, 16(09):216-218
2. Chen B. (2016) Research on Reliability Analysis of Computer Network Based on Intelligent Computing [J]. *Computer Nerd*, 4:176.
3. Jin M, Zang S, Zhang M. (2016) Reliability Analysis of Computer Network Based on Intelligent Computing [J]. *Technology and Economic Market*,1:185.
4. Bi J, Wen X, Ding X, Sun S. (2015) Reliability Analysis of Computer Network Based on Intelligent Computing [J]. *Communication World*, 17:32.
5. Chen S, Pang W. (2015) Reliability Analysis of Computer Network Based on Intelligent Computing [J]. *Information Technology and Informatization*, 08: 200-201.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

