Original Research Article

Analysis of Computer Network and Communication System

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ABSTRACT

The network communication is realized and developed based on the gradual improvement of the computer network. Although the communication system itself is not equivalent to the computer network, but there are many integration and connection in current communication system and the computer network, which has formed a complementary and mutual development of the situation. With the emergence and application of new systems and computer network technologies, such integration and development will be more in-depth and closer. This article is focus on the computer network and the communication system, and does a brief analysis of the status quo, so that it is easy to understand by the majority of readers in the shallow level.

KEYWORDS: development, trends, functions, systems, communications, computer networks, computers, information

1. Definition of Computer Network

The simplest definition of a computer network is the collection of autonomous computers that are interconnected and shared for the purpose of resources sharing.

Broadly speaking, transmission of information is the main purpose of computer network, which connect a number of computer system by using a communication line. A computer network consists of a transmission medium and a communication device.

From the user point of view, the computer network is defined as: it is an automatically manage network operating system which manages resources used by users. The entire network is like a large computer system, which transparent to users.

A more general definition is: the use of communication lines will be geographically dispersed, with independent functions of computer systems and communications equipment connected in different forms, to achieve resource sharing and information transmission by a complete network software and protocol.

In general, the computer network is distributed in different geographical areas of the computer and a dedicated external equipment with communication lines interconnected into a large, powerful system, so that many computers can easily communicate with each other to share information, hardware, software, data and other resources. In a nutshell, a computer network is a collection of many autonomous computers that are interconnected by communication lines.

2. The Combination of Computer Network and Communication System Development Prospects

Computer communication network is a combination of computer technology and communication technology to form a new communication, mainly to meet the needs of data communications. It connected multiple computers, terminals and ancillary equipment and equipped them with the corresponding network software in different geographical location to achieve the communication process of resources sharing and the formation of the communication system. It not only meet the document transmission needs of local area of a business, company, school and office data, it can also perform information exchange, storage and processing, provide voice, data and image synthesis in a country or even in the worldwide. The computer communication revolution brings the important facts as follows: There is no essential difference between data processing equipment (computers) and data communication devices (switching transmission equipment). There is no essential difference between data communications, voice communications, and video communications. The distinction between a single processor computer, a multiprocessor computer, a local area

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network, a metropolitan area network, and a remote network is becoming increasingly blurred. These trends led to the component manufacturing integration to system integration of the computer industry and the communications industry. Another impact is the development of an integrated system that can transmit and process various types of data and information. No matter technology itself or the organization of technical standards, both are forced to complete a variety of communications to develop a single public network system, which can access to the world's information sources and a variety of information through this network in a simple and unite way.

3. The Computer Network Communication System Risk Prevention

The vulnerability and loopholes of computer network communication systems are the objective condition of possible risk, and the threat or attack is the subjective condition of risk. With the popularity of Internet technology, the transmission of information becomes unusually fast and convenient, which undoubtedly a great driving forces for human development. However, when the open interconnection of Internet networking technology brings human information resources to share the full potential, it also let the outside world access to your information without authorization and steals your information resources at the same time. Security risks of computer network communication system are mainly from:

(1) Hardware components. Security risks of hardware components are mostly from the design, and these problems mainly reflect the physical security issues. Since this problem is inherent, the solving way is usually strengthen the manual compensation measures, software programs is seldom used. Such security risks should be reduced or eliminated as much as possible when come to self-made hardware and hardware purchasing.

(2) Software components. Security risks of software components are mainly from the design and software engineering problems. The negligence in the software design may leave security vulnerability; the unnecessary redundancy in the software design and the software is too long and too much, and there is a security vulnerability that is unavoidable; the software design is not modularized according to the requirements of the information system security level. The security level of the software cannot reach the proper level of security; software engineering caused by the software system internal logic confusion, resulting in garbage software, this software is absolutely not available from the security point of view. Software components can be divided into operating platform software, application platform software and application business software. These three types of software form a software component system in a hierarchical structure. The operating platform software is at the base level, which maintains the platform on which the system components are running. Any risk of the operating platform software can be directly compromised or transferred or extended to the application platform software. The security level requirements of the operating platform software required for the security of the information system not to lower than the system security level requirements. In particular, the operating system security level of the security service component of the system must be at least higher than the level of system security. Therefore, it is strongly recommended that the commercial and universal practical operating system must not be used directly in security service components of the operating system. Application platform software is supported by the operating platform in the middle level to run support and management applications business software. On the one hand, the application platform software may be affected by the risk of software from the operating platform. On the other hand, any risk of the application platform software can be directly compromised or passed to the application business software. Therefore, it is very important to apply the security features of the platform software. At the same time, the application platform software must provide the necessary security service function for the application software while providing its own security protection. At the top level, application business software can directly deal with the user or entity. Any risk of applying the business software is directly expressed as the risk of the information system, so the integrity of its security function and its own security level must be greater than the minimum requirements for system security. In general, outsourced commercial application business software is more secure than homemade application business software.

(3) Computer network and communication protocol. In today's computer network communication protocols, the communication protocol between the LAN and the dedicated computer network is relatively closed because it cannot connect and communicate with heterogeneous computer networks directly. This 'closed' computer network is better than the open Internet security features, there are two reasons, one is the relative closure of the computer network system, reducing the external computer network or site directly into the system the possibility, but the information of the electromagnetic leakage and protocol analysis is based on the exists of interception of the problem: Second, the dedicated computer network itself has a more complete, mature identity authentication, access control and permission division and other security mechanisms.

4. Analysis on the Convergence Trend of Computer Network and Communication System

Information technology usually refers to the natural information function to expand or enhance the technology, human natural information functions including eyes, ears, nose and other information collection function; brain information storage and processing functions; nerve, muscle and other information transmission function and so on.

These people's natural information function manned this information system has been closely linked with the organic. Therefore, as a kind of information technology to enhance and expand the natural information function of human beings, it gradually develops towards the comprehensive direction to meet the natural needs of human and human society feature although the initial development process often begins with the simple single information function. For computer and communication to form a computer network, the information collection, processing, storage, transmission and utilization of five natural information functions may be based on the formation of a variety of information technology through the modern and bring in the global human society a broader space. This will be a more profound information technology revolution.

Although the traditional computer and communication system, the computer network system will continue to have a parallel development stage as a relatively independent system with the formation, but with the social information process, people demand for integrated information function growth. Further integration of computer, communication systems and computer network system is the trend. First of all, computer functions are increasingly being integrated into the computer network, which caused lesser and lesser computer applications. Now, the communication system and the computer network system are further merging along two basic paths: First, the traditional information transmission service-based communication system through the integration of computer technology, expansion of non-communication information services to the computer network direction; the traditional information processing services consisting mainly of computer networks, and further integration of advanced communications systems, including the development of integrated information services for more advanced computer networks.

The first path, the process of evolution from traditional communication system to the computer network can further analyze from the following aspects:

(1) Computing technology and computer introduction of basic transmission technology to produce digital communication system digital changes is into the communication node function. The development of digital communication technology not only improves the quality of the information transmission of the communication system itself, but also lays the foundation for the further integration of the communication system and the computer network system.

(2) The need for computer networking, which facilitates the communication system from traditional telecommunications, image transmission services, resulting in an important branch - data communication system. The data communication system is used to transmit the computer's binary coded data information as its main design goal. Not only its internal structure and its user terminals are more dependent on the computer, so often referred to as computer communication network. It has actually become an indispensable part of the computer network system. The data communication system will lose its main significance if left with the computer and computer network system. Therefore, the data communication system is an important part of the emergence and development of communication systems and computer network system for further integration.

(3) No matter from integrated needs of applications or considerations of channel utilization improvement, the modern communication system is moving toward to integrated business which with direction of integrated voice, image, text, data and other forms of information. The use of telephone network to send fax text and computer data is the earliest integrated business transmission. After the development of broadband cable with TV cable structure and wide area network such as microwave, satellite and fiber, and high-speed broadband channel resources, which have recently become hot topics, now we not only focus on high-speed transmission, but also all integrated transmission of a variety of information services to provide the conditions of large capacity requirements. In fact they are integrated business communication network. ISDN and B-ISDN, which are called integrated services digital networks, are further standardized from the system architecture and user interface, and will further promote the development of integrated service communication networks. This integrated business transmission technology development made the traditional telecommunications services, radio and television services and computer data transmission business integrated into the same system or even the same channel. Data transmission itself is the function of data communication system, and it is often a integral part of computer network. Therefore, a variety of integrated business transmission of communication systems actually integrates traditional communication systems and computer network systems in the field of information transmission to together.

(4) On the basis of ISDN integrated service transmission, the terminal equipment of the communication system began a major innovation, that is, to the intelligent, integrated direction of the so-called 'multi-functional standard intelligent communication terminal.' It is actually a computer, the traditional telephone, fax machines, computer data terminals, and as well as television display, video and other image terminal equipment together. Although the initial design of this multi-function terminal device is to provide users with convenient integrated service transmission, but since the introduction of computer intelligent terminal, not only the traditional communication services can use the computer to the necessary processing, storage, to improve communication quality and the development of many new communications services, and from the perspective of data communications, the computer terminal has also become a computer network node actually as long as equipped with appropriate high-level application software that can constitute a variety of computer networks. The change of ISDN multi-function intelligent terminal will promote the evolution of

communication system to the direction of computer network, and because of the characteristics of integrated business, this will make computer network has a wider range of application functions. People are also studying how to integrate the OSI and ISDN standards from the communications architecture.

(5) With the development of social comprehensive information needs and the degree of intelligence within the communication system, operational communication systems, especially those operating public service communication networks, have begun to utilize the advantages of their existing communication networks. Various kind of information is base to the original communication users such as weather, transportation, tourism, business, finance, education and other information query services. This information service involves the daily work and life of thousands of households, and through the daily use of telephone and other communication terminals to facilitate access, so it is very popular and has fast development. From the initial manual desk, 168 telephone information query system to the automatic management of the large database system, it adds communication nodes into communication systems, and began to increase the information for the production of computer nodes. With the aforementioned multi-functional intelligent terminal applications, more and more information query service can be more convenient through the intelligent terminal computer interface. Communication system to provide such information query service is not belong to the information transmission service function, it seems to be 'do not work'. In fact, that is a 'value' in the original 'transmission of information' services on the basis of an increase 'query information' service function, thereby increasing the use of traditional communication system value. The communication network, which adds this non-information transmission service function, is called a value-added network. It is seen that the development of computer management network in communication network is also an important factor to promote the further integration of communication network and computer network.

From the perspective of the traditional computer network, due to the development of communication technology, but also continue to influence and expand the computer network of institutions and functions, the computer network and further integration with the communication system can also be analyzed from the following two aspects:

With the OSI as the representative of the computer network architecture, to further open the direction of development, in the low-level communications, in the network layer under the unified management, it is an open architecture that can support a variety of data link and physical layer protocol. Not only a variety of popular LAN, MAN and WAN communication systems have been gradually absorbed into the computer network system as its communications subnet, but also continue to develop a variety of new communication technology and communication systems to absorb. In this open new network system structure, it can be very convenient and can integrate various fields together such as: local area network and the wide area network, air wireless, satellite communication network and ground cable, optical fiber communication network, mobile communication and fixed communication, public service communication network and various special communication network, low-speed network and high-speed network and so on. A variety of communication systems that are integrated in a computer network system have produced a number of qualitative changes compared to stand-alone communication systems. They are part of a computer network system that supports computer network systems with greater connectivity, adaptability and system configuration flexibility in a wide, interconnected environment, and ultimately will affect the performance and functionality of high-level applications in computer network systems.

In the low-level open system support, the computer network system for users and applications of high-level system is also looking forward to further open the direction of development. It not only supports a wide range of application layer protocols, but also supports a wider range of application environments through a programmable standard interface API. Computer network high-level open system is also conducive to a variety of applications directly related to the new information technology, continue to integrate into the computer network to promote the application of service functions continue to expand. From the beginning of the information processing-based resource sharing, widely used distributed processing to fiber-based high-speed communication support distributed parallel computing are in development. Since the computer network is based on the composition of the communication network, communication services that provide user directly to the computer network is also evolving. From the early e-mail, e-phone, to the recent comprehensive business transmission technology and multimedia technology support under the support of a wider range of communications applications, such as video telephony, video conferencing, fax, dynamic image compression transmission has also been in rapid development. These communication functions which achieved through the computer network has a higher quality of image broadcast communication system than the traditional telecommunications due to computer processing, storage and a variety of acquisition, and control the introduction of display technology, the formation of computer network intelligent communication services. Intelligent communication functions, computer network resource sharing, distributed processing and other functions will be further integrated to support the wider and natural human society.

5. Analysis of Computer Network System and Communication System from Systematic Perspective

A computer network is usually a system that is formed by a combination of computers and communications. Computer and communication are also systems, they may be a relatively independent system, but also may be a computer network in a larger system of a factor, so the computer network system and communication systems exist between the existing and the difference between the complex relationship.

According to the system view, the system is composed of a number of elements which have certain functions and have certain connection with each other. The relationship between the elements constitutes the system structure, and the system exists in the double stipulation of function and structure. Therefore, the difference between the different systems, first we need to study the differences in system functions. In the concept of the system, the system function is the function that influences the system and its environment. For the artificial system, the main environmental factor is to use the system or the system to serve the 'user'. So the basic functions of the system can usually be attributed to the system to use its users to provide the basic service functions. Based on these basic concepts of the system, we first look at the difference between the communication system and the computer system is obvious, because the basic function of the communication system is to provide information transmission services, and the basic functions of the computer system is mainly to provide information processing services. Of course, we also note that in the modern communication system, in fact, there is also contains some information processing functions often, such as digital program-controlled switches, communication controllers, and etc.; there are some internal information transmission components in the computer, such as internal bus, I / O channel and so on which belong to the internal structure of the system or substructure function. The nature and functionality of the subsystems contained in the internal structure of the system have an impact on system functionality and performance, but in general they are designed to implement a given system function. The same function of the system can have different structure, and contains the same elements of the system because of the different structure can have different system functions, so we define different types of systems to see the internal structure of the system as a 'black box', and mainly to see the difference between the basic service functions they provide for the 'user' environment. The 'black box' method is an important method of system analysis.

Although the communication system or communication network in the computer has an indispensable role, but from the computer network system function, it is still mainly within the system, the computer network to the network provide resource sharing, distributed processing, parallel computing, etc. The internal guarantee of network information processing function. Most of the computer network users on the computer network system within the communication system and its information transmission is basically transparent, that is, 'black box' within the matter. Therefore, people who engage in the computer are usually more natural to the computer network as a computer system structure expansion, but the communication sector and engage in communication is still the traditional computer network as a regular extension of the communication system. So far at home and abroad many of the computer networks of academic institutions, conferences, publications also attached to the communication. Their reasons seem to be 'full', because there is no communication system support, the computer network can not constitute, and its function cannot be achieved. Moreover, communication has longer history than the computer, and so far it is still very 'strong.'

From the system point of view, although the computer network system is formed by the combination of computer and communication, but it is not a simple addition of computer and communication, nor is it a simple expansion and extension of computer or communication system. As we all know, system science has an important point: 'the overall function and performance of the system is better than it contains the elements of the function and performance of the sum', that is commonly used '1 +1> 2' formula. In fact, the computer network system, produced by the combination of computers and communications, has produced many new qualitative changes from the beginning regardless of its system function or system structure. For example, the resource sharing and distribution processing functions under communication support are far from being done by a computer group that is not networked. The computer network application system based on the resource sharing and distribution processing function further analyzes the information storage technology such as remote control, radar and other information acquisition technology, automatic control machine, robot and other information control technology and distributed database technology are constantly integrated into the computer network in this large system. This makes the computer network a comprehensive feature of integrated information collection, processing, transmission, storage and utilization control functions, 'network users' of computer networks, and more and more from professional computer users to non-computer professionals in all walks of life. The services they receive from the computer network system may be either information processing services, information storage, information inquiry, information collection or information control services, and may even be obtain information transmission communication services directly from the computer network system. The more is by the information function of the integrated services. Obviously, this broader set of integrated information functions of the computer network system is neither a computer system nor a communication system that can be compared and replaced.

6. Concluding Remarks

In short, the computer and the combination of communication are to form a computer network, By using information collection, processing, storage, and transmission, the five major natural information functions through the modern basis of the formation of a variety of information technology in the global human society, it will be a more profound information technology revolution. But the opportunity and risk coexist in today's large-scale information network environment; risk is always there no matter how perfect the information security is. Therefore, the appropriate method is using intelligent methods for risk management in the entire network communication process. The possibility of occurrence and the consequences of the risk can be minimize within the acceptable range, and maximize the benefit of the target through the use of intelligent analysis and control methods of the degree of control.

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