

Research on Future Development and Applications of Computer Network Technology (Post-print)

Authors: Anledeng

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Abstract

Computer technology has brought tremendous convenience to our lives and fundamentally transformed our way of living. In particular, computer network technology plays an irreplaceable role in both production and military domains. This paper analyzes contemporary computer technology, elaborates on the application status of computer network technology, and prospects its future development.

Full Text

Preamble

Abstract: Computers have brought tremendous convenience to our lives, fundamentally transforming the way we live and work. Computer network technology, in particular, plays an irreplaceable role in both production and military applications. This paper analyzes the current state of computer technology, elaborates on the application scenarios of computer network technology, and explores its prospective future development.

Keywords: computer; network technology; application; development trends

Since the Third Industrial Revolution, science and technology have undergone earth-shaking changes, particularly with the advent of electronic computers, which have completely transformed people's production and lifestyles. Modern life is already inseparable from computer networks. Through computer networks, developed technologies such as communications, positioning systems, and remote control have provided access to greater resources and enhanced convenience. Our convenient lifestyle depends on computer network technology; only through thorough understanding, development, and utilization can we further improve our lives.

Computers possess numerous functions, and networks can connect these functionally diverse computers, thereby strengthening the overall capabilities of an organization. This integration enables more powerful computing functions and more rational resource utilization. Consequently, it is unsurprising that computer network technology has developed rapidly in aerospace, industry, agriculture, and service sectors. Mastering this technology and integrating it with production processes benefits enterprise development. While the emergence of Internet technology has fostered many emerging industries, it has also caused the decline of some traditional ones. Therefore, we must conduct serious research on computer network technology, understand its origins and development, and only in this way can we keep pace with the times.

1. Overview of Computer Network Technology

Computer and network technologies are inseparable, as networks rely on computers as their carrier; without networks, many computer functions cannot be realized. Only through their combination can greater effects be achieved—this is the computer network technology we use today. This technology, increasingly applied in production and daily life, has become a hallmark of the information age, demonstrating its critical importance and attracting growing attention. Presently, not only are there specialized computer network programs, but many other industries have also begun leveraging computer network technology to transform traditional production methods and harness its services. Fundamentally, computer networks connect several independent computers through electronic communication technologies, forming a unified whole that enables resource sharing, enterprise management, and interpersonal communication. This virtual network represents an emerging technology that, while intangible, connects seemingly unrelated computers through specific rules and protocols to achieve information sharing, fundamentally changing our way of life. Initially, many doubted the power of computer networks, dismissing it as fantasy or even rejecting the technology altogether. In retrospect, this technology holds profound practical significance, as it continuously transforms our production and living patterns.

2. Current Development Status of Computer Network Technology

Computer network technology has penetrated every aspect of our production and life to such an extent that we can no longer imagine living without it. A popular phrase from last year perfectly captures this dependence: in summer, true comfort means having air conditioning, WiFi, and watermelon—illustrating how computer networks have become as essential as basic necessities. Examining the development trajectory of computer network technology reveals that it follows an evolutionary path from low-level to high-level, from simple to complex, and from theory to application, with its application scope continuously expanding.

2.1 Critical Role in Information System Construction

Computer network technology provides extremely reliable transmission protocols for information system construction and inter-system communication. In particular, TCP/IP has essentially become the universal transmission protocol among various devices, making information exchange between systems more convenient and efficient while significantly improving software and hardware development efficiency and system transmission performance. Additionally, data mining, data storage, and query technologies within computer networks provide crucial support for core information management in information systems. However, the convenience brought by computer network technology is accompanied by risks: firstly, the core technology is relatively complex, demanding high technical proficiency from operators; secondly, information system security is not invulnerable, as various hacking and penetration techniques continue to emerge, with network attack and defense technologies evolving rapidly, bringing both professional hackers and security-defending “red teams” into public view.

2.2 Importance in Modern Research and Education

In terms of scientific research, computer networks enable us to access relevant technologies and literature, fully drawing on previous experience. Many experiments have already been conducted by others with excellent conclusions that we can directly utilize for subsequent work—all made possible by current Internet technology. In the pre-Internet era, researchers could only work in isolation without awareness of global technological progress, forcing them to repeat others’ mistakes. Today, Internet technology enhances communication and exchange, facilitating mutual discussion and accelerating scientific progress. In education, computer networks have become increasingly indispensable. Teachers can utilize networks for learning and lesson preparation, enriching students with extracurricular knowledge, and employ multimedia teaching to improve efficiency. Often, visual presentations through images or animations are more effective than verbal explanations, deepening student understanding and enhancing learning efficiency. Furthermore, remote education has become popular, allowing students to access instruction from renowned teachers at home through computer networks. Computer networks continue to undergo research, testing, and functional improvement in teaching and scientific research.

Computer network technology also significantly improves public service delivery. Previously, public service systems were relatively backward, with staff attitudes often suboptimal, causing frustration and wasted time for citizens. With computer network technology, the establishment of public service systems has become much more convenient, creating new breakthroughs that enhance both accessibility and efficiency.

3. Future Development Trend Analysis of Computer Network Technology

The above analysis demonstrates how computer network technology has transformed various industries, greatly facilitating our lives and production. From its initial immaturity to today's sophisticated applications, this technology has made substantial progress and gained widespread adoption. However, while fully enjoying these benefits, we must acknowledge existing developmental shortcomings and security concerns worth considering. Future development must address these deficiencies and overcome obstacles to promote healthier and more robust growth.

Several typical technological developments in computer networks have created significant impacts, some within local area networks and others in wide area networks, challenging current centralized network management systems. The development of LAN and WAN technologies has encountered many bottlenecks requiring advanced management solutions. This represents both a developmental challenge and an opportunity—if successfully addressed, administrators will be able to control larger-scale networks, connecting enterprise networks across different locations and enabling unified management of distributed networks. For distributed management, network technology is primarily used to collect and monitor data from multiple consoles, distributing it according to different needs to achieve comprehensive utilization. This functionality enables unified management of distributed networks.

4. Future Development Direction Outlook

In the future, informatization will become even more pronounced, and the evaluation of socio-economic development will depend on the advancement of computer network technology, which will determine future economic and social progress. China missed the first two industrial revolutions but seized the opportunity of computer network technology development during the third. Today, our multimedia and communication technologies are highly advanced, with the independently developed BeiDou satellite navigation system ranking among the world's best. Going forward, China will increase investment and develop toward the Internet. Future Internet terminal devices will become more advanced, Ethernet speeds will continue to increase, and 6G communication technology will be realized. Internet architecture will also become more scientific and rational.

Based on the above analysis of computer technology development, we can offer several prospects. China should strengthen research on computer networks to fully leverage this technology for scientific research, production, and other services.

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(Author's Institution: Shengzhou Radio and Television Information Network Co., Ltd.)

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