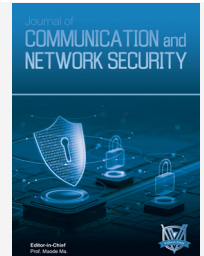




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RESEARCH ARTICLE

ANALYSIS AND PROSPECT OF 5G NETWORK SECURITY ISSUES

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ABSTRACT

Background and Purpose: As a next-generation mobile communication network, 5G has attracted widespread attention due to its high speed, massive connectivity, and low latency. Despite these advantages, the security of 5G networks has become a major concern. This study aims to analyze key security issues in 5G networks and explore corresponding security assurance approaches.

Methods: This paper analyzes the main security challenges faced by 5G networks and elaborates on security assurance measures at different levels, including network architecture and security mechanisms. In addition, the future development of 5G network security is discussed.

Results: The analysis clarifies major security risks in 5G networks and summarizes effective security assurance measures that can enhance network security.

Conclusion: The study provides a structured understanding of 5G network security and offers reference for improving security protection and guiding future development of 5G networks.

KEYWORDS

5G Network, Security Issues, Prospect Classification

1. INTRODUCTION

5G is a major breakthrough in the field of mobile communication. 5G network will bring a higher peak rate experience and high-quality services for high-density user connections. It can be said that in the rapidly developing society, 5G network will play an increasingly important role. However, while recognizing the advantages of 5G network, we also need to discover the potential security issues of 5G network as early as possible. If 5G network security cannot be guaranteed, it will affect user experience, cause losses to user interests, and even threaten national security, thereby hindering the development of 5G network. Therefore, we must conduct in-depth research on 5G network security.

The transmission speed of 5G network is hundreds of times faster than that of 4G network. Firstly, 5G network has a fast transmission speed; secondly, it can flexibly support various devices, such as mobile phones, tablets, smart devices, fitness trackers, etc.; thirdly, 5G network can improve end-to-end performance and support more data transmission and usage. The main goal of 5G network is to allow end users to enjoy network services at all times. According to the previous development law of mobile communication technology, 5G communication technology will have ultra-high spectrum efficiency, ultra-fast information transmission speed, super-strong user experience, and wider coverage. In addition to the characteristic of high transmission rate, the security of 5G network communication is also incomparable with 4G network. For this reason, 5G network communication technology will be widely adopted.

2. ANALYSIS OF 5G NETWORK SECURITY ISSUES

2.1 5G Network Security

In 5G network, the Nomadic Local Area wireless access (NoLA) network plays an important role. Ensuring the stable structure of the NoLA network can improve the disaster recovery capability of 5G network. During the operation of the NoLA network, there are significant potential security hazards. Due to the dynamics and compatibility of NoLA, it is easily controlled when providing services. Once the NoLA network is controlled during movement, it will damage the network system structure and affect the normal operation of the network system.

2.2 Security of Device-to-Device Communication

In 5G network, the Device-to-Device Communication (D2D) of 4G LTE-A will be used, and the main functions of D2D are initiation and communication. The initiation mechanism of D2D is based on fixed wireless resources, while the communication of D2D needs to use relevant resources opportunistically, which may disrupt the use of wireless resources in cross-network scenarios. Due to the large number of user terminals, corresponding mechanisms are required to ensure the capabilities of corresponding device nodes, identity authentication, and the ability to resist malicious access by users. If the network system security is not high, it will affect network performance and fail to meet the normal use of users.

2.3 Security Issues Caused by the Dual Identity of Access Devices

In some 5G scenarios, to expand network coverage, some suppliers will temporarily upgrade mobile access devices to small base stations. Although this can provide users with better network services, due to the switching of device roles, these terminals have higher permissions at the security level, making some access devices need to transmit information through the small base stations after role change. In this case, information leakage may occur due to an unknown identity.

2.4 Security Issues Caused by Ultra-High-Density User Access

With the gradual emergence of 5G network advantages, more and more people are beginning to choose 5G network. The increase in 5G network users may also lead the server to receive security authentication requests from a large number of users, which may cause security requirements for encryption methods of massive users, performance of encryption servers, etc. If the security of 5G network system is not high, it may lead to the leakage of user information and bring losses to users (Yang & Huang, 2019). For example, 5G Internet of Things (IoT) is applied in the automotive industry. In connected cars, the use of IoT devices and functions in communication services will be greatly improved, including the interactive integration of devices such as braking systems, environmental monitors, GPS, and multimedia; drivers can maintain real-time contact with enterprises, such as paying for fuel at gas stations, fees at drive-thru restaurants, highway tolls, and enhanced functions such as traffic management. Due to the rapid expansion of IoT devices and edge computers, the largest network attack incidents will show exponential growth. In network edge environments, the interconnection of billions of devices may introduce vulnerabilities that weaken the overall security posture, thereby increasing security risks for enterprises

2.5 Security Issues Caused by Channel Leasing

A channel leasing mechanism is introduced in 5G network to improve channel utilization and reduce energy consumption. However, under the channel leasing mechanism, users cannot effectively perceive idle channels and cannot complete the authentication of the relevant authorized leased channels. In this case, when users use 5G network, they are vulnerable to security attacks, leading to the theft of important information (Yu, 2019).

3. 5G NETWORK SECURITY ASSURANCE MEASURES

In the development process of 5G network, security issues have always existed. To effectively address security risks, it is necessary to develop corresponding security technologies and adopt effective security assurance measures to provide users with high-quality network communication services.

3.1 Strengthen Market Management

5G market supervision is an important means to regulate the network market. To effectively avoid 5G network security risks, it is essential to strengthen market supervision. Firstly, relevant departments should effectively supervise the network market and establish a matching supervision mechanism; secondly, the market needs to provide users with trusted 5G network services, enabling users to establish a transparent and trusted identity authentication with 5G network service providers (Chen, 2018). In addition, relevant departments should optimize the allocation of network resources, provide security services, and build a supportive user identity and credit confirmation mechanism to provide users with high-quality network services.

3.2 Increase the Application of Network Security Technologies

Network security must rely on security technologies. 5G network emphasizes functionality and flexibility, but its security has not been effectively addressed. Therefore, it is particularly important to conduct in-depth research on security technologies and increase the application of security technologies (Xie, 2018). Firstly, relevant departments should conduct in-depth research on 5G network security technologies

and make efforts in technological breakthroughs; secondly, increase the application of encryption technologies, encrypt at the network layer and transport layer to prevent information from being attacked during transmission; finally, increase the application of identity authentication technologies, conduct joint management of different identities and account information of an object, thereby improving the security of user information.

3.3 Pay Attention to the Internet of Things Security System

Sufficient attention must be paid to the security issues of IoT from edge to core enterprise networks, branches, and shared cloud resources. Firstly, evaluate the security of its content, and then verify network access requests. In this case, it is necessary to develop an integrated architecture that shares network security vulnerability threats, security incident data, and supports automatic response technologies. Careful consideration should be given to the use of machine learning and artificial intelligence technologies to handle security threats, thereby reducing network attacks and improving security.

3.4 User Rights and Interests Mechanism

The secure use of 5G networks is closely associated with the protection of user rights and interests, highlighting the necessity of establishing effective mechanisms for safeguarding these rights. During the development of 5G networks, priority should be given to strengthening user protection, addressing users' security requirements, and developing comprehensive platforms for rights-related complaints and redress, thereby ensuring the reliable use of 5G networks (Li & Liu, 2017).

4. PROSPECT OF 5G NETWORK

5G network is an extension of 4G network and a demand for China's communication development. It can be said that 5G has broad development prospects. With the expansion of people's living needs, the demand for mobile communication will also increase, making in-depth network research more and more urgent. On the path of future mobile communication development, 5G network should be closely integrated with future services to continuously improve the pertinence of 5G network development. At the same time, compared with traditional mobile communication, 5G network meets the needs of the times, and the application of advanced communication technologies in 5G is becoming more and more common. Therefore, in the future development of 5G network, it is necessary to conduct in-depth network research, improve network levels, take advanced communication technologies as the core, improve the transmission speed of mobile communication, increase spectrum utilization, and expand the capacity of mobile communication (Li & Fu, 2015). In addition, in the development of 5G network, in-depth research on 5G network security will also become an important topic. Strengthen the combination of management and control technologies, extend security technologies from traditional networks to various environments such as the cloud and IoT devices, and realize the safe and reliable development of the new generation of networks.

5. CONCLUSION

In summary, the advantages of 5G network are obvious, mainly reflected in the transmission speed. With 5G network, users can transmit and obtain information quickly. However, in the process of 5G development, security issues are inevitable. The network is open. While 5G network facilitates people's communication needs, it also brings certain threats to mobile communication security. Therefore, in the process of developing 5G network, we should not only expand its functions and performance, but also conduct in-depth research on network security, and create a safe environment for the operation of 5G network with advanced security technologies and security assurance measures, so as to provide better services for users.

REFERENCES

- Chen, K. (2018). Analysis and prospect of 5G network security issues. *Network Security Technology and Application*, (8), 69-70.

Li, H., & Fu, Y. (2015). Analysis and prospect of 5G network security issues. *Radio Communications Technology*, 41(4), 1-7.

Li, W., & Liu, X. (2017). Analysis and prospect of 5G network security issues. *Electronic Technology & Software Engineering*, (1), 198.

Xie, Z. (2018). Analysis and prospect of 5G network security issues. *Computer Products & Circulation*, (6), 45.

Yang, H., & Huang, H. (2019). Key technologies and standardization progress of 5G network security. *Information and Communications Technology and Policy*, (2), 31-34. <https://doi.org/10.12142/ZTETJ.201904001>

Yu, L. (2019). 5G network security technology and development. *Electronic Technology & Software Engineering*, (2), 185.