2010 2nd International Conference on Industrial and Information Systems

The problems in Campus Network Information Security and Its Solutions

Cuihong Wu
School of Computer and Information,
Shanghai Second Polytechnic University
Shanghai 201209 China
chwu@it.sspu.cn

***Abstract*—In the Age of Information, network education pays more attention to the application of IT technology and the training of talents, which makes learning more of customization and of opening up. In order to better enable learners to go beyond the limitations of space and time to acquire knowledge; in order to provide excellent learning environment for greater freedom and greater choice of learning activities space, the project to building campus network has become the basis of all university building work. It is directly related to the quality and level of their teaching and scientific research work. The campus network has a number of tasks such as teaching, research, management and communication with the outside. Therefore, the issue of network security has become a priority to campus network management. Obviously, the current Internet is convenient but at the same time it is unsafe. As part of the Internet and the unique attributes of campus network, it is more easily attacked when enjoying the service provided by the Internet. This paper starts from the current security status of the campus network, analyzing threatens to campus network security and strategies to maintenance of network security, so as to establish a suitable campus network security system, and introduce some current popular campus network information security solutions.**

Keywords- campus network; firewall; network security; security technology

I. INTRODUCTION

With the development of society, network information is used by people more and more and its importance is becoming notable, the network has become the most critical thing of a country's political, economic, and military resources. Currently, there are many network applications which are not security; it's mainly in information leakage, information tampering, illegal use of network resources, illegal information penetration, fake, etc. As the prevalence of multi-computer network security risks, prevent "hackers" is weak, corporate and government websites have been "attacked" more and more frequently, these has caused enormous economic losses. Therefore, the network information system security and prevention and its Secrecy seems increasingly important [1].

With the rapid expansion of the campus network connectivity, the network applications have increased rapidly, at the same time, the campus network information security has caused more attention today. In the existing network and application systems, there are almost no security measures has been taken, and security vulnerabilities in the host operating system and application system are also without any processing, there are many problems within system management, all of these formed a serious security problem , thus seriously threatening the safety of the campus network. In the recent network monitoring, system and the host was found to attempt to be invaded by others, a large number of security vulnerabilities exists in the system, and there are many security vulnerabilities which are difficult to avoid and eradicate; Also, a virus transmitted through the network severely affected the normally running of the campus network [2].

II. WIDESPREAD PROBLEMS IN CAMPUS NETWORK

College and University are usually equipped with a computer room; there are some computers which can directly access to the campus computer network in this room, students and faculty are usually available to use these computes to access to internet to get information and learn online. However, the lack of unified management software and system for monitoring and logging, these computer rooms can't be essential in the management state. Most rooms have serious flaws in registration and management system, so the internet user's identity can not be recognized.

Its very convenience for us to use functions provided by the campus network, but it also has become a quick way to transfer the virus. Network virus outbreaks can led directly to the user's privacy and important data leaks. Network virus is also a great consumption of network resources, resulting in a sharp decline in network performance, even can severely bring down the network performance.

In the campus network, attacks, intrusion the machines, theft of another account, the illegal use of the network, illegal access to unauthorized files, harassment by mail and other incidents often occur, and so on, indicating the users' safety consciousness in the campus network are very unimpressive.

Most serious problem is the shortage of funds for the network construction in college or university, limited funds are mainly invested in network equipment, systematic input for construction and management of network security has not been

978-1-4244-8217-7/10/$26.00 ©2010 IEEE

taken into account seriously. Because of lack of the awareness in major universities, management institutions are not perfect, administration system is imperfect, management technology is not advanced; these factors make the university's network management center can't take any measures and preventive measures for information security. Meanwhile, Countries do not have well-developed and rigorous network security system, there is no strict implementation of standards for the campus network security management; this is an important reason for the proliferation of network security figure 1 is the common types of network security threats.

By the analysis above, the campus network security issues is mainly in the following areas:

Password disclosure can result in data leakage. A variety of database systems is running on-line in the campus network, such as teaching management system, student achievement management system, campus card management system, test bank and so on. The user personal misconduct or negligence of safety measures can lead to these database password be lost, the data may be illegally removed or replicated, resulting in information disclosure, in serious circumstance, may result in serious illegal deletion of data. Therefore, setting password is also very important [3].

Campus networks can connect with the internet with routers; of course, internet users can enjoy the convenience of fast and unlimited resources of this platform, but also have to face to the risk of an attack.

There is a considerable security risk within the campus network, internal users are relatively understand more about the network structures and applications of models than the external users, therefore the internal security threats are the main threats. At present, hacking tools flooded in the Internet, hackers use network protocols, server and operating system security vulnerabilities and management oversight to illegally access to network resources, deletion of data, damage the system, these attacks caused to the adverse effects of the campus network of and the damage to the reputation of the school.

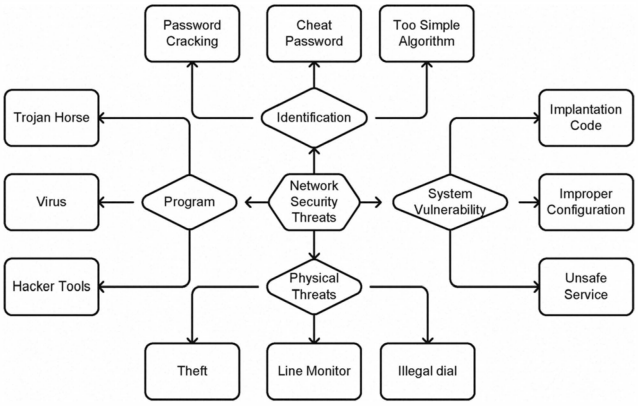

Figure 1. The common types of network security threats

There are a lot of security vulnerabilities within genuine operating system, these security vulnerabilities pose many serious threats such as the information security, using of the system, network operations and so on. Owing to the lack of awareness of copyright, piracy software, films and television resources is used in general in the campus network, while the spread of the software takes up a lot of network bandwidth; on the other hand it brings a certain network security risks. For example, Microsoft's XP operating system company has some limitation in updating the software; if the users install Microsoft's XP operating system with the pirated one, the computer system will leave a large number of security vulnerabilities. On the other hand, downloading from the Internet software which may has hidden Trojans virus, backdoors and other malicious code, therefore, many systems are invasive and used by the attacker [9] 。

the scope of computer applications have gradually expanded in the campus, access points to the campus network have increased largely, but most of these nodes is the new and some of the protective measures have not been adopted, this may causes the virus flooding at any time, information loss, data corruption, network attacks, System collapse and other serious consequences.

Some of the attackers and distributors send spam and spread harmful information using unmanaged campus server as a transit station, this has brought a serious influence to the network and brought great influence on the school's reputation.

In summary, the security situation of the campus network is very serious, in order to solve these security risks and vulnerabilities, according to the structural features of the campus network and security issues which the campus network faced, security solutions should be taken to the campus network and it should be implemented as quick as possible.

III. THE SOLUTIONS FOR CAMPUS NETWORK INFORMATION SECURITY

For the campus network, at first, we should have a unified plan and take full consideration based on security risk analysis to the campus network. Secondly, we should actively adopt various advanced technologies such as virtual exchange network (VLAN), firewall technology, encryption technology, virtual private network (VPN) technology, PKI technology, and achieve centralized configuration, monitoring, management. Finally, we should strengthen formulating of systems and specifications about the network security secrecy, and strictly implement it [4].

Ensuring the physical security of various equipments of computer information systems is the premise to protect the security of whole network system. It mainly includes three aspects: environmental safety, equipment safety, lines security. Environmental safety is the security protection to the system environment, such as the regional protection and disaster protection. Equipment safety consists of anti-theft of devices, anti-crash, anti-electromagnetic information radiation leak, to avoid line interception, anti- electromagnetic interference and power supply protection.

Campus generally consists of two parts. Part of the internal network, including LAN, office automation LAN, teaching LAN, library LAN, etc.; the other is the external network, including a number of public servers. From a network security perspective, they belong to different network security domain, so the Internet firewall should be installed in the border, and

the corresponding security policy control should be implemented. To protect the internal network, it is important that the main switcher on the main segment should be equipped with the probe which has the function of intrusion detection system, intrusion detection system is important to protect network access control.

The operating system is the foundation for all computer terminals, workstations and servers to run properly, operating system security is very important. The server version of the genuine operating system should be used in the critical servers and workstations (e.g., database server, www server, proxy server, Email server, backup server and network management stations, etc.)

At the same time, because of the problems of design and version, there are many security vulnerabilities within the operating system; the improper use of the security settings will also increase the security vulnerabilities, so as to cause a security risk. in the absence of other higher security level commercial operating system for choice, operating system security management and development of enhanced security measures is the key factors, In addition to, the operating system's security problems has come from the virus threats and hackers penetrated the network to destruct the data. Network anti-virus tools must be able to protect all possible virus entry from the internet. Anti-virus program should be installed for online virus program detected the virus clean-up or tracking.

The main objective of hackers is to steal data and modify the system illegally. Risk assessment tools for system should be used to help system administrators identify whether the user privileges command should not be installed or should be reduced. In addition, real-time intrusion detection system IDS can track user's activity, invasive testing, also can prevent internal staff from to damage Intranet. When the irregularities detected, the system will immediately notify the administrator, the administrator can record the corresponding test results and information to track the intruder, to determine whether it endanger the safety of the system and take effective preventive measures to ensure the system's important data and important documents from damage [5 6].

As students computer room is connected with the campus network, take into account the needs of the students will inevitably use the USB storage device on the machine in the computer room, and students are often to download some software from the Internet on the machine, which left a hidden danger for the spread of the virus. Therefore, to achieve the overall campus network anti-virus, combined solutions should be taken which include using a server anti-virus, gateway anti-virus and Stand-alone anti-virus.

By setting permissions and password of the network resources for all users, network administrator can save the user name and password, transmit and provide a complete user record in encrypted manner, the analysis methods can guarantee the system security. Administrators of network also need to establish and maintain a complete database of network users, strict management of the system log is also inevitable. To assess and review the security situation regularly on the campus network system, pay more attention to the dynamic network security concerns and adjust the relevant security settings for intrusion prevention, emergency repair system.

Appropriate control strategy can be applied to achieve the security of the campus network, such as access control policy, network access control, Operation Access Control, the directory security control strategy, network monitoring and lock control. In addition, there is information encryption strategy. Using encryption algorithm to encrypt sensitive information, you can prevent unauthorized persons illegally to steal information. There is a number of encryption software which can encrypt messages; files et al. Use encryption software can effectively protect data, files, password, and control the information to transmit safely through the network. You can also use backup and imaging technology to enhance the integrity of the campus network. Backup technology is the most common measures to improve data integrity, the method is to protect the data in another place to make a backup, once data is lost, we can use backup of the original data[7 8].

During the construction for the campus network, network security needs of a unified security system specifications that should be combined with the actual situation in the campus network, and then the unified security system specifications should be implemented in the whole network. The management should be implemented first before the Implementation of network techniques safety, the construction of the security organization system is imperative. Specialists should lead the construction of the security system implemented in the security implementation process with the relevant corporation of other departments; they also lead the whole departments to continuously improve the system security level.

To achieve the security of the campus network information system, although technical measures and methods is very important, we must attach importance to the construction and improvement of management system. The campus network security vulnerabilities is obviously, in addition to design the network to increase functionality for the security services, improve system security measures, we must make great efforts to strengthen the network security management, develop a safety management system and implement an appropriate safety management principles, information network security is a very systematic work, only when the network security management and the network security technology are used simultaneously, then they can build a comprehensive information network security system.

IV. CONCLUSION

As lots of universities and colleges construct their own campus networks, and the application of campus networks becomes more and more widely, information security is an inevitable factor to ensure the networks running smoothly and maximize its functions. Providing a well informational education environment is the strong backup of model education works and popularizes the information technique education and campus networks is the hardware guarantee of the environment. How to make the campus networks running with high efficiency is an important issue. The text introduces and analyzes lots of factors and potential factors which intimidate the security of campus networks, and gives advices on how to

build up the systems of campus networks from management and techniques.

REFERENCES

[1] Saadat M. Network Security Principles and Practices (CCIE Professional Development) (CCIE Professional Development) (Hardcover) [M].Cisco Press, 2007: 52-78.

[2] William S. Network Security Essentials: Applications and Standards (3rd Edition) (Paperback) [M]. Oxford: Blackwell business, 2006: 15-47.

[3] Mark R, Roberta B, Keith S. Network Security: The Complete Reference [M]. Osborne:McGraw-Hill Osborne Media, 2003-11-17.

[4] Kwot T.Fung Network Security Technologies, Second Edition [M]. AUERBACH, 2004/10/28, 11-123.

[5] Joel S, Stuart M, George K. Hacking Exposed: Network Security Secrets & Solutions [M]. McGraw-Hill, April 2005:23-126.

[6] B. Harris , R . Hunt. TCP / IP securitythreats and attackmethods .Computer Communications, 1999, (22) :Page.885-897 .

[7] Venter H S, Eloff J H P. Data packet intercepting on the internet : how and why? A closer look at existing data packet -intercepting tools .Computers & Security, 1998, 17(3) :683~692 .

[8] SHEN ChangXiang, ZHANG HuangGuo et al. Survey of information security. SHEN ChangXiang et al. Sci China Ser F-Inf Sci | June 2007 | vol. 50 | no. 3 | 273-298

[9] Campus Network Problems and analytical papers [EB/OL], http://www.mlunwen.cn/jisuanji-network/xiaoyuanwangcunzaiwentijiqifenxilunwen.html, 2010-5-4