Study on the Construction of Digital Library Based on VLAN Technology

Hanping Hu, Chenjie Zhang

Changchun University of Science and Technology, Changchun 130022, China

Abstract. This paper introduces the basic concepts of VLAN technology, and points out the advantages of VLAN Technology. Analysis of network application and network structure of university library, puts forward the college library network division strategy.

Keywords: VLAN, Virtual LAN, Library Network.

1. Introduction

Along with the development of network technology, modern local area network has been basically completed the transformation from the traditional LAN to exchange LAN, especially the application of VLAN switching technology into a new concept to the local area network based on the network, we provide ample bandwidth also provides management. The emergence of VLAN technology reduces the workload of network administrators; restrict the interconnection and management of computer equipment is no longer under the complex geographical environment and location; the network structure becomes more flexible, convenient, arbitrary; also can make full use of cyber source.

And with the continuous development and expansion of the school, the size of the library has been expanded, the traditional local area networks based on shared resources cannot meet the application request because traditional division switching network model by dividing the network configuration of the main physical segment to achieve, so each network node is easy to form the shared transport channel and a channel conflict network storm, so the communication efficiency of the network structure and network security will restrict network development library, so we have introduced a VLAN technology.

2. Brief introduction of VLAN Technology

2.1 VLAN technical definition

VLAN（Virtual Local Area Network）is a network of sites which are not rigidly adhere to a physical location, and the flexibility to add different logical subnets in a network technology as needed. It is based on the exchange of the LAN, through network management software can be built across different segments, end-to-logical networks on different networks. IEEE issued in 1999 by the IEEE 80211Q standard draft plan to standard VLAN. VLAN has broken many inherent concept of traditional network, the network structure becomes more flexible, convenient.

2.2 The division of the VLAN

Subnetting is a highly technical work, to consider many factors to meet the practical requirements and the future development needs of the scheme. If the partition is improper, not only can not improve the performance of the network, but also because of frequent VLAN of data transmission, and reduce the performance of network. Generally speaking, the specific subnet division depends on the network address, data flow and safety control regions, administrative system, geographical distribution and other factors.

There are several ways to implement virtual LANs primarily for switched Ethernet:

VLAN based on the switch port

The switch port to divide the members of the network, the configuration process is simple. At present, the classified according to the port VLAN is still one of the most common ways.

The method according to the exchange-port Ethernet switch to divide, Users can logically partition the switch ports open so that all ports belong to a different VLAN. The advantage of this method is simple and easy division. The disadvantage is the low degree of automation flexibility is not good,

when the number of computers on the network exceeds a certain number, set the work will become extremely complicated, in addition to its mobile devices to increase the change cannot solve problems.

VLAN based on MAC address

In MAC address-based VLANs, the switch MAC address and switch port to the site to track when a new network site needs to be classified according to a particular virtual local area network, regardless of how the mobile station in the network, due to its MAC address remains unchanged, so users do not need to re-configure the network address. The disadvantage is initialized, all users must be configured.

VLAN based on the network layer

The method according to the host's IP address or protocol type (if supported multi-protocol) to be divided. The advantage is within the VLAN MAC address or physical location if the user changes, as long as it's the same IP address, it still belongs to the pre-set VLAN. In addition, it can be classified according to the type of agreement, which according to the composition of the network layer protocol VLAN, the broadcast domain can span multiple VLAN switches. However, this method is less efficient, since inspection of a network layer address of each packet requires processing time.

VLAN based on IP- broadcast group

This method will be extended to the WAN VLAN, dynamic port definition will need to communicate that to a VLAN, any workstation as long as confirmation affirmative answer to the radio broadcasting group, you can become a member of the broadcast group. It has a high dynamic performance, but is not suitable for the local area network, mainly in the high efficiency.

3. The application value of VLAN

VLAN is a broadcast protocol to solve the problem and proposed security Ethernet, the technology has the following significant advantages.

3.1 Isolate broadcast

Broadcast storm control, improve bandwidth utilization. VLAN provides firewall function to prevent broadcast storms switched networks. A VLAN form a small broadcast domain. By reducing the broadcast domain reduce broadcast traffic, freeing up bandwidth to the user so as to reduce broadcast storm.

3.2 To increase the security of the network

Prohibit unauthorized access; ensure the overall security of the network. VLAN according to the type of application and access privileges to be divided, can be configured to limit the number of users in each VLAN, prohibit any unauthorized connection attempts to access allowed. Between users in different VLAN To visit each other, we must be able to achieve secure access by routing mechanism.

3.3 To simplify the network management and maintenance

Strengthen centralized control, simplifying network management. For networks using VLAN technology, a VLAN according to departmental functions, objects, group or application of network users will be divided geographically into one logical network segment. Without changes to the physical network connection can be arbitrarily moved between workstations working groups or subnets. Using virtual network technology, it greatly reduces the burden of network management and maintenance, reducing network maintenance costs.

4. Application of VLAN technology in the library networks

4.1 Analysis of University Library in the network application and structure

University Library computer system typically includes: integrated library management system, the reader retrieval systems, digital library resources systems, online database retrieval system, electronic reading room management system, video-on-demand systems, Web and FTP INTERNET service systems, office automation systems. According to the actual situation of our strategy based on IP network layer can be divided into four subnets: center room, integrated management systems, electronic reading room and office network.

4.2 College library network division strategy

Built on each floor several VLAN switch to IP rules defined in the loan department like this across the different floors of the department, we use VLAN across switches to be divided, to be drawn in the same business sector where the "logical workgroups" . For private offices and all staff are unified with the machine in the network division office this VLAN because the private nature of the use of these machines is very susceptible to viruses and attacks, which would limit their information flows in one VLAN, broadcast storms and attacks viruses are routed port separated band does not spread to borrow and integrated management systems in sub-circulation, so as not to affect the normal opening work. If the transmission of data packets between different VLAN port forwarding settings inside the virtual switch routing to achieve a normal communication between the various sub-sectors, facilitate the user applies improves bandwidth utilization. At the same time we can also set different access rights to different subnets, for example, bibliographic databases, and students involved in the collection of information access rights can be set higher, so as to ensure the security of the core data.

Integrated Management System is a proprietary system of library work, almost all business libraries such as the Collection, cataloging, collection, circulation, periodicals, readers management are achieved by changing the system, and the system is directly related to the main bibliographies and student information database servers, we bring the two main business database server and all the flow is divided into a workstation VLAN, assign an internal IP address, and INTERNET isolated, so all other clients have no access SETVER, effective servers and workstations to ensure the safety of the window, is the work of running the library to get a reliable guarantee.

Center room contains bibliographic information, such as queries, information inquiry Readers retrieval systems, digital resources system, and online database retrieval and so really should have an IP address, all end-users and libraries within the internal campus network must have access to this network. These servers can be placed in a VLAN, you can use a firewall to protect the front.

Finally, for the provision of information retrieval, digital resources services and electronic reading room internet access, because some dangerous operation of its diversity and the user cannot be expected, it should be divided into a separate VLAN, in order to reduce the use of electronic reading computer may cause a threat to the library network.

5. Conclusion

The application of VLAN technology can effectively control the broadcast storm, ensure the network performance, flexibility and expansibility greatly, which improve the efficiency and security of network, enhances the security and cooperation between different departments of the university library, which allows the network to better service in the library, provide better service to the readers.

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