

Analysis and Applications of Campus Network Flow Control

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Keywords: Digital campus, flow control, flow strategy

Abstract. Assisting the teaching and administration greatly, campus network is becoming more and more popular. However, more and more problems appear. Especially the flow control becomes a key problem for the campus network management. The paper analyzed the principles of flow control and its security management, and proposed the solution of broadening and regulating.

Introduction

With the booms and popularizing of network technology and applications, the scale of campus networks grows to a level of what the developed countries' have. As the most important career of digital information, the campus network is being occupied by a lot of non-critical applications, such as P2P applications. At present, campus network is the one of the network which contains the most P2P applications. It should be something right for student to think actively and try something new. However, it brings troubles to the network management. What's more, the problems of undesirable websites, cyber-attack, etc, cannot be evaded during the management of campus network.

Digital campus bases on a suitable network speed. Although the speed grows to hundreds of megabytes, some even to gigabit, applications are updating as well. Without the proper distribution and management of bandwidth, the bandwidth resources would be wasted, and the running of regular applications might be slowed down. The flow grows quickly by the applications of VOIP, Video conference and OA. Meanwhile, the uncontrolled downloading, P2P application and worm occupy the bandwidth; even might cause meltdown of network. It could not be solved by just broadening the bandwidth. Without optimizing the controlling measure, it would only lead to a higher operating cost.

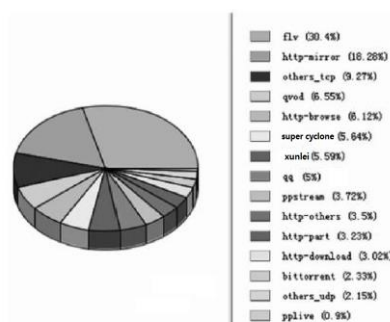


Chart 1 Analysis of outlet flow

Major causes of the problem

Weak protection from virus

The restore card with a virus killer is a common method to protect the campus network from malicious software and virus. It is easy to set up and operate. However, its virus killer could not be updated. When the computer turns on, the worm in the network may reproduce and produce a lot of packet to block the network.

Excessive downloading and video streaming

It is popular to download music and movies by some downloading applications. The P2P downloading applications require a lot of bandwidth, while some students play computer games and watching videos online, the bandwidth for teaching applications is fewer.

Illicit links

The number of cyber attacks of consuming bandwidth resources grows quickly. Campus network, with weak protection, the illicit links consumes the bandwidth and make the server out of service. What's worse, most illicit links are attached with Trojan applications, which also could infect computers and lead to the block of network.

Hence, we should control the outlet flow by broadening and regulating to realize a high efficient consumption of outlet bandwidth.

Broadening

It is common to downloading by P2P on the internet. The campus network also has an amazing number of outlet flows by downloading. The campus network should contain more downloading servers to enrich the in-campus resources:

Enhancing the protection

Regular and continuous updating of operation system is necessary. Users often download system patches outside the campus network, which take users more time and also bring pressure to the outlet bandwidth. In order to solve the problem, CTGU Network Center bought Kingsoft online virus killer to help the users save time and bandwidth.

Available downloading of applications

The Network Center also set up a software downloading server, providing the downloading and updating of small-scale software in common use. The users could download the software in campus net safely, which reduce the infection of virus and release the pressure of outlet bandwidth.

Setting up VOD system

The popularization of BT, Thunder and HDV, the bandwidth of campus network was almost occupied by stream media and video downloading. The campus network was slowed down. In order to meet with the users' requirements of entertainment and less the downloading, the Network Center of Chongqing Three Gorges University sets up the system of Bofu Truran VOD and uploads the popular TV programs to it. Some of them are HDVs. It shares the videos and the downloading reduces, while the bandwidth resource is saved.

Providing online broadcasting

Live broadcasting is another critical factor influence the bandwidth. Especially at the time of great events or sports match, it occupies a lot of band width. The Network Center opened online live broad casting on the net, providing 8 channels in common use to solve the problem.

However, compared with the regulating, the broadening could only release the outlet pressure in some scale.

Regulating

Set up a RT Analysis System to observe the abnormal flow

Cyber attack and virus often appear in a network. It is difficult to analyze or prevent technologically. However, it is much easier to observe by statistical significance. The number of cyber attacks of consuming bandwidth resources grows quickly. Campus network, with weak protection, the illicit links consumes the bandwidth and make the server out of service. What's worse, most illicit links are attached with Trojan applications, which also could infect computers and lead to the block of network. The system could be used to manage the outlet information, observe the flow, and display

the flow by chart or HTML. Hence the users could see the flow directly. The function of alarm in the system could provide the alarm service of abnormal flow.

Distribute different applications with different bandwidth

Web is the main application, so it gets a priority on bandwidth distribution. For example, it's minimum bandwidth is 100K, standard of 2M, and maximum of 10M. When the network was congested, 2M could be provided; when it was free, 10M; when WEB flow was few, some other applications could use it's bandwidth. The maximum for Thunder is 5M, while the other P2P applications are limited to 1M. Even more strict limitation could be proposed, such as the maximum uploading of Thunder is 0, which means to change the P2P style to a single-track flow; or limits the P2P flow to an amount of which is less than 30% of the total until the network is free.

Upper limit according to IP

It is used to solve the problem of some users occupy too much bandwidth. The users could be divided into different groups, such as teacher group, student group, network management group. Different groups have different upper limits. The teacher group and network management group are prior than the student group. The bandwidth can also be distributed by different times. The student group may have more bandwidth in the evening. The linkage limitation is similar to the IP limitation. Different IP has different linkage limitations. It should be noticed that the linkage should be more in the computer center, for each IP in the computer center contains a lot of links. Although applications of P2P and streaming media are controlled and limited, some user's daily flow is over 10G. A blockade system developed by the Network Center was in use to warn and blacklist the user. The blockade would be over in 24 hours. At last, the bandwidth could be distributed by different times. During the working time, office group and teaching group owes more; while the other time for student group and teachers dormitory.

Besides the controlling and limiting, ACL could be used at the outlet devices to limits the outside users linking to then in-campus users. It could help to keep away from the virus and garbage flows.

Conclusion

The controlling strategy determines the bandwidth distribution. The proper strategy could help to release the problem of bandwidth occupying by BT, Thunder and video streaming. The bandwidth is distributed properly. The critical applications and service are guaranteed while the teaching, administrating, researching could be in good condition.

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