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Web Bandwidth Monitoring and Reduction with Firewall Operation

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ABSTRACT

With the emergence of various internet applications, the use of the internet is being abused in the maximum possible way. Various organizations strive to pay the exceeding amount for the usage of the excess bandwidth. Considering this issue, we have designed a powerful tool that assures comfort of the network administrator and reduces the burden of over usage of bandwidth for an organization. With the help of token bucket algorithm, we have devised a system that ensures efficient monitoring and reduction of the bandwidth, which erases some major drawbacks of the existing systems. In addition, when it comes to end-to-end measurement of bandwidth, this tool also provides robust features of IP tracking and IP blocking, hence providing the firewall operation. Moreover, the feature of capturing of live desktop is added, which gives the network administrator, full control and access to the client's screen. Designed with a different approach, this system enhances the comforts of a network administrator and hence the organization, this system ensures that there is no unauthorized usage of the internet and the bandwidth usage is within the predefined limits.

Keywords— **Client/server, Distributed applications, Network operating systems, IP tracking and IP blocking, Firewall Operation, Token Bucket**

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I. INTRODUCTION

The usage of the internet is being misuse due to its misuse in a variety of ways, leading to the wastage of bandwidth, introduction of viruses in the system, spyware, etc. Many organizations spend large amount of money to the ISP provider but the overall estimated cost of the bandwidth used for actual productive purpose proves to be too less than what is being paid. In such situations, it becomes mandatory for a network administrator to manage the resources, which will lead to the optimized use of the resources. The bandwidth monitoring system is employed in order to find the usage of the available and bottleneck bandwidth and to control it from exceeding beyond the maximum value. The firewall operation blocks the usage of unauthorized websites using their IP address, thereby minimizing the excess use of the allocated bandwidth. Although the present system monitors the excess usage of bandwidth and ceases the access to unauthorized websites, one can surely download his personal documents saved on the Google Drive. This usage goes unnoticed most of the times, which proves the inefficiency of the system. For example, an employee access social networking sites like Face book, Twitter, etc. during work hours, which abuses the efficient usage of the bandwidth. If the network administrator is aware of this loss, he/she can directly prohibit the person from using the bandwidth and thereby actions can be taken against the employee. Our goal is to build most robust techniques in order to produce accurate results at each intermediate step.

II. LITERATURE SURVEY

1. The Quest for Bandwidth Estimation Techniques for Large-Scale Distributed Systems.

In recent years the research community has developed many techniques to estimate the end-to-end available bandwidth of an Internet path. This important metric has been proposed for use in several distributed systems and, more recently, has even been considered to improve the congestion control mechanism of TCP. Thus, it has been suggested that some existing estimation techniques could be used for this purpose. However, existing tools were not designed for large-scale deployments and were mostly validated in controlled settings, considering only one measurement running at a time. In this paper, we argue that current tools, while offering good estimates when used alone, might not work in large-scale systems where several estimations severely interfere with each other. We analyze the properties of the measurement paradigms employed today and discuss their functioning, study their overhead and analyze their interference.

Our test bed results show that current techniques are insufficient as they are. Finally, we will discuss and propose some principles that should be taken into account for including available bandwidth measurements in large-scale distributed systems.The end-to-end available bandwidth (available) is one of almost important characteristics of an Internet path. Thismetric is fundamental for the operation of many emergingapplications, such as video streaming, online gaming, peer-to-peer and content delivery systems. Thus, the attention ofthe research community has focused in recent years on theproblem of the available estimation, and several techniquesand inference methods have been proposed in literature. So that both accurate and fast estimation of theend-to-end available can today be obtained.

2. Bandwidth Monitoring for Network-Aware Applications

Network-aware content delivery is an attractive approach to mitigate the problems produced by the significant fluctuations of the available bandwidth present in today's Internet. Such network-aware application requires information about the current condition of the network to adapt their resource demands. Such information can be obtained at the network level, the transport protocol level, or directly by the application. This paper compares two kinds of application-level monitoring (at the sender and receiver side) and transport-level monitoring with regard to their ability to provide useful information to network-aware applications. Applications that aim to deliver a response in a fixedtime interval are in a difficult position.Recently, a number of researchers haveproposednetwork-awarenessas a mechanism to bridge the wide performance gaps and to cope with the significant bandwidthvolatility that may be encountered. A network-aware application adapts its content delivery in response to net-work conditions so that the application's demands do notexceed the bandwidth available (to this application). In times of network resource shortage, objects are dynamicallytranscoded to reduce the amount of data that must be transmitted.

3.End-to-End Available Bandwidth Measurement Tools: A Comparative Evaluation of Performances

In recent years, there has been a strong interest in measuring the available bandwidth of network paths. Several methods and techniques have been proposed and various measurement tools have been developed and evaluated. However, there have been few comparative studies with regards to the actual performance of these tools. This paper presents a study of available bandwidth measurement techniques and undertakes a comparative analysis in terms of accuracy, intrusiveness and response time of active probing tools. Finally, measurement errors and the uncertainty of the tools are analyzed and overall conclusions made. In data communication networks, high available bandwidth is useful because it supports high volume data transfers, short latencies and high rates of successfully established connections.

Obtaining an accurate measurement of this metric can be crucial to effective deployment of QoS services in a network and can greatly enhance different network applications and technologies. Several applications need to know the bandwidth characteristics of their network paths. For example, some peer-to-peer applications need to consider available bandwidth before allowing peers to join the network. Overlay networks can configure their routing table based on the available bandwidth of the overlay links. Network providers lease links to customers and the charge is usually based on the available bandwidth that is provided. Service Level Agreements (SLAs) between providers and customers often define service in terms of available bandwidth at network boundaries. Available bandwidth is also a key concept in congestion avoidance algorithms and intelligent routing systems. Techniques for estimating available bandwidth fall into two broad categories- passive and active measurement.

III.PROPOSED SYSTEM

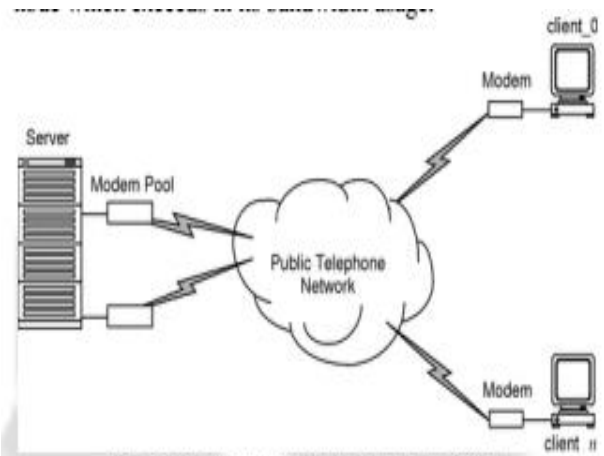

Fig. 1: Internet provide to server to client.

Bandwidth monitoring System

Theproposed system is to find the usage of the available and bottleneckbandwidth and to control it from exceeding beyond themaximum value. The firewall operation blocks the usage of unauthorized websites using their IP address,thereby minimizing the excess use of the allocatedbandwidth. Although the present system monitors theexcess usage of bandwidth and ceases the access tounauthorized websites, one can surely download

hispersonal documents saved on the Google Drive. This usagegoes unnoticed most of the times, which proves the inefficiency of the system.

MODULES:

1. Client
2. Server
3. Network administrator.

Module Description:

Client: Upload or download the data.

Server: which is being used or being downloadedat the user's end, while he is monitoring the bandwidthusage.

Network administrator: which is to decidethe status of the content as valid or invalid and if it is invalidcontent, then block the user whose bandwidth usage exceedsthe maximum value. If the content is a valid content, theadministrator will thus allow the user to go o with hiscurrent task, but he will be assigned a reduced bandwidth.

IV. ALGORITHMS

1. Token Bucket Algorithm
2. Packet pair Algorithm
3. Pathchar technique

1. Token Bucket Algorithm:

The token bucket is an algorithm used in packet switched computer networks and telecommunications networks. It can be used to check that data transmissions, in the form of packets, conform to defined limits on bandwidth and burstiness (a measure of the unevenness or variations in the traffic flow). It can also be used as a scheduling algorithm to determine the timing of transmissions that will comply with the limits set for the bandwidth and burstiness.
The token bucket algorithm is based on an analogy of a fixed capacity bucket into which tokens, normally representing a unit of bytes or a single packet of predetermined size, are added at a fixed rate. When a packet is to be checked for conformance to the defined limits, the bucket is inspected to see if it contains sufficient tokens at that time.If so, the appropriate number of tokens, e.g. equivalent to the length of the packet in bytes, are removed ("cashed in"), and the packet is passed, e.g., for transmission. The packet does not conform if there are insufficient tokens in the bucket, and the contents of the bucket are not changed. Non-conformant packets can be treated in various ways:

- They may be dropped.
- They may be en-queued for subsequent transmission when sufficient tokens have accumulated in the bucket.
- They may be transmitted, but marked as being non-conformant, possibly to be dropped subsequently if the network is overloaded.

A conforming flow can thus contain traffic with an average rate up to the rate at which tokens are added to the bucket, and have a burstiness determined by the depth of the bucket. This burstiness may be expressed in terms of either a jitter tolerance, i.e. how much sooner a packet might conform (e.g. arrive or be transmitted) than would be expected from the limit on the average rate, or a burst tolerance or maximum burst size, i.e. how much more than the average level of traffic might conform in some finite period.

2. Packet pair Algorithm:

Packet-pair is a technique for estimating the bandwidth of a streaming media connection over the Internet. To estimate bandwidth, the server sends two or more consecutive packets of highly entropic data, and the client estimates the bandwidth by measuring the difference between the times that it receives the packets. This method is usually reliable; however, if the client traverses a Network Address Translation (NAT), firewall, or proxy server, the packet-pair bandwidth measurement might be inaccurate. This technique is not necessary for devices with known bandwidths, such as cellular phones.
Packet Pair algorithm is used to detect the bottleneck bandwidth in the network. Detecting the bandwidth has great significance for providing various network sources and improving internet services for the Packet Pair technology plays an important role in the study of detecting the bandwidth. The active detecting algorithm of bandwidth based on the Packet Pair technology.

3. Pathchar technique:

Pathchar is a tool written by Van Jacobon that tries to estimate the characteristics of links along an Internet path. The program works by sending packets of varying sizes and measuring their round trip time. It correlates the round trip times with the packet sizes to calculate bandwidth.
It uses the results from earlier hops for calculations on father hops. For our purposes, all we need to know is that the pathchar program uses an active algorithm that sends packets varying in size from 64 bytes to the path MTU with a stride of 32 bytes.

V. CONCLUSION

The bandwidth monitoring system thus reduces the abuse caused by the users to the allocated bandwidth. The network administrator can now relax as there are control and reduction techniques applied to the exceeding bandwidth usage. Some of the most important aspects considered during the analysis of the product's performance are its ability to prioritize and allocate network bandwidth among hosts on a network, provide enough security as to prevent tampering with or taking over a disproportionate amount of bandwidth, centralized operations, multiplatform GUI.

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