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WAN Optimization to Speed up Data Transfer

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Abstract

Currently the development of digital technology has advanced very rapidly, as well as data storage and data transfer. As the development of information technology and the use of data that increasingly large, it will be a main factor that affects to the company's business. The amount of data that must be processed both at headquarters and other branch offices make the process of data exchange become the main issue in term of speed and delay. Due to data exchange being a top priority in the company, often the WAN network bandwidth used by the file system, email system, proxy, web system becomes peak or full during peak hours thus slowing down accessing file or email system. One method to reduce bandwidth usage is almost full is to use WAN Optimization tools. WAN Optimization has several functions, including Data Streamlining, Transport Streamlining, and Application Streamlining. The purpose of this study is to analyze performance network when WAN optimization was applied in the system. Data is taken from simulated file transfers conducted several days and at different hours. Data were analyzed using Wireshark tools and calculation formula. The results can be seen if there is a significant increasing performance, delay become better from 287 ms to 0.604 ms for file size 93 MB and jitter increased 12.4% better. It can be concluded that with the optimization of WAN, the process of data transfer becomes more efficient both in bandwidth and time during working hours.

Keywords: network optimization; WAN optimization; data transfer; delay and bandwidth

1. Introduction

In the last decade, the development and use of IT has increased rapidly, including in data storage. Data in physical form, now all become data in digital form. This affects how to transmit and distribute the data. All data in digital form will be send, distributed, and transmitted over the internet network. A delay problem will appear if the data to be sent exceeds the available bandwidth capacity. The WAN Network become congested with high traffic which causes a lot

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of data loss and jitter[1]. This will certainly affect the performance of staff who use the data which will ultimately affect the performance of the company as a whole.

Therefore many large companies usually invest their money by building IT infrastructure in each branch office to support the company's business every day. As the development of information technology and the use of data that increasingly large, it will be a main factor that affects to the company's business. The amount of data that must be processed both at headquarters and other branch offices make the process of data exchange become the main issue in term of speed and delay. To provide applications and services required by users, IT department in the company must invest in infrastructure for up to tens of millions of dollars, such as File Server, Mail Server, Storage and Tape Backup Server at each branch office. Once the infrastructure is completed in large companies that have hundreds or even thousands of overseas branches, there will be new problems, namely network complexity and high cost. In order to solved the problem WAN optimizer was introduced which will increase the performance of the network.

Although almost all areas related to network and computing have improved rapidly, Wide Area Network (WAN) has always been an obstacle that must be addressed and resolved by IT engineer[2][3]. Many IT engineer have tried many things to improve throughput, by purchasing a larger bandwidth or data compression module, but have not been able to help increasing the performance of the application in sending and transmitting data in WAN. To cut costs and simplify infrastructure, several companies have taken steps to centralize distributed systems in previous branch offices. Therefore, we want to implement an appliance that can make easier and simplify the WAN network as if it were similar to a LAN network for applications that use WAN communications on both centralized and distributed environments. In order prove that our work is better than we measured three main parameter[4]: Delay, Jitter, and throughput.

2. Literature review

2.1. Wide Area Network (WAN)

WAN is computer network over a large geographical area and often build by leased telecommunication circuits[5]. Normally, WAN connected computers between branch offices and headquarters in different cities or countries. Each of computer in each office has aplications for user and called as a host. The network that connected the hosts called subnet. The task of the subnet is to carry messages from host to host, as the telephone system carries the words (really just sound) from the speaker to the listener[6]. In most WANs, the subnet consists of two distinct components: line transmission and switching elements[7]. The transmission line moves bits between machines. They can be made from copper wires, fiber optics, or even radio links. Most companies do not have transmission lines, so they leased line from telecommunication companies. Element switching or switch, is a computer specialist to connects two or more transmission lines. When data arrives in the incoming path, the switching element must specify an exit path to forward the data[8]. This switching computer is a nickname in the previous time, and now better known by the name of the router.

2.2. WAN Optimization

The goal of WAN optimization is to increase performance of data transfer over wide area networks[7]. For that purpose there are several techniques in wan optimization such as Deduplication, Compression, Web Caching, Wide Area File Services (WAFS), and Forward Error Correction (FEC). In our work will focus on compression and web caching.

2.2.1. Compression

The basic principle of compression on a WAN product is shown in Fig. 1, which is to represent a frame of data being shortened by a certain compression algorithm method to be transmitted over the network. The basic idea is to reduce data size therefore it will save space, bandwith and time to transmit. This data compression occurs only on the WAN path and then decompressed automatically after receiver receive the data. This will certainly save more space on the WAN path for other packages so as to make the network more efficient. The compression can be used not only for data content or payload but also included data header as we can see in Fig. 1. Optimization with compression