Technologies for the Design and Construction Services, WAN Optimization

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Abstract

When operating business continuity and disaster recovery systems, it is necessary to transfer the data via WAN (Wide Area Network) to replicate the data from the currently operating system by accommodating it in a secondary office backup system. However, in some cases, it is difficult to ensure sufficient bandwidth or communications speed via the WAN, which connects the currently operating systems and the backup systems. This paper describes what causes such problems in WAN connections and how these problems can be solved by employing a WAN optimization system. The paper also describes how much improvement is enabled by WAN connections when a WAN optimization system is employed.

Keywords

WAN, Bandwidth, Latency, WAN optimization

1. Introduction

Recently, WAN optimization systems, which improve WAN (Wide Area Network) communications efficiency by adopting unique modifications to communications protocols, are attracting much interest. NEC marketed the WAN optimization system, WanBooster in June 2006.

This paper describes WAN optimization by taking our WanBooster as an example in discussing the efficiency provided by the employment of WanBooster for business continuity and disaster recovery systems.

2. Factors Influencing WAN Communications Efficiencies and the Methods for Promoting Such Efficiencies

There are two major factors that influence WAN communications efficiency, which are bandwidth and latency. The bandwidth value is the amount of data to be transferred per second. The higher the value is, the greater the communications efficiency becomes. However, the communications cost increases in proportion to the bandwidth value. The latency value quantifies the delay in transferring data to a recipient. A lower value indicates better communications efficiency.

Normally, the latency value will be greater in proportion to the distance between the communications sites. An example of WAN connections shows a latency value of approximately 10msec. for communications in the Kanto area, approximately 20msec. between Tokyo and Osaka, and approximately 35msec. between Tokyo and Kyushu. If these values are increased the communications efficiency decreases. This is because the TCP connection usually waits for an ACK (acknowledgement) response from a data recipient and the waiting time, which accompanies every ACK response, will be equivalent to the latency time. **Fig.** below shows the relationship between latency and the effective speed of TCP. The effective speed is determined according to the latency value, regardless of the WAN bandwidth. This Fig. is calculated based on 64Kbytes of optimal window size for the TCP connections.

WAN optimization systems such as WanBooster focus on the bandwidth and latency in order to promote the efficiency of communications protocols and aim at optimal use of WAN.

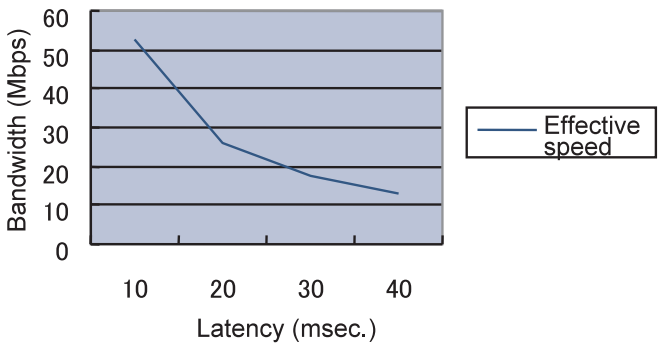

Fig. Relationship between latency and the effective speed of TCP. (Optimal window size of 64Kbyte)

Table Effective speed of CLUSTERPRO disk mirroring function.

Conditions	Without WanBooster	With WanBooster (communications start without any data in the cache memory)	With WanBooster (data completely matches the cache memory)
Effective speed	6.34Mbps	8.77Mbps	50.6Mbps

2.1 Method to Promote Bandwidth Efficiency

WanBooster divides the data transmitted on a line into specific volumes and converts them into blocks in order to store them in the hard disk cache memory of the WanBooster. When a data pattern that is the same as one in the cache memory is found on the line, it is converted into a location data in the cache memory so that the data volume to be sent via WAN can be downsized. Also, if the data pattern cannot be found in the cache, the downsizing of the data volume can be achieved by compressing the data before transmission. This method is effective for all applications software that uses TCP connections.

2.2 Methods to Promote Efficiency over Latency

TCP protocols usually wait for ACK responses. WanBooster modifies such protocols so that less ACK response waiting time occurs in the system. This modification reduces the deterioration of the communications efficiency due to the latency time caused by waiting for ACK responses. The method is effective for TCP connections, and also for the CIFS (Common Internet File System) which is adopted for Windows file sharing, and MAPI (Messaging Application Program Interface) which is adopted for Microsoft Exchange servers.

3. Application Examples for Business Continuity and Disaster Recovery Systems

The efficiency was measured when WanBooster, a WAN optimization system was employed in business continuity and disaster recovery systems. Remote cluster configuration with CLUSTERPRO X 1.0 for Windows was employed for a disaster recovery system to examine the efficiency of the disk mirroring function.

Measurement Conditions and the Results

Measurement was executed by assuming the following conditions; the IP-VPN network in Kanto area is used, line bandwidth is 10Mbps, latency speed is 10msec. The results are shown in **Table**. The effective speed achieved 63.4% of the line bandwidth when WanBooster was not employed. However, the effective speed improved up to 87.7% of the bandwidth when WanBooster was employed to start communications under the condition that no data was stored in the cache memory. It is considered that this result was brought about by improving the efficiency in reducing latency and also by compressing the data. When communications were executed employing WanBooster and all of the transmitted data matched that in the cache memory, the effective speed achieved was 506%, which indicates an efficiency improvement exceeding the capability of the WAN bandwidth.

Under the above conditions, performance improvements of 1.4 to 8 times were achieved when WanBosster was employed.

4. Conclusion

This paper has described the improvements in system performance efficiency by employing WanBooster, a WAN optimization system and WAN communications are used for business continuity and disaster recovery systems. WanBooster will be constantly updated in order to be capable of supporting more applications protocols such as NFS and it is expected that the applications fields of communications protocol efficiencies will thus be widened.

* Windows and Exchange are trademarks or registered trademarks of the Microsoft Corporation in the US and other countries.

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●The details about this paper can be seen at the following.
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