

An Interactive Web Meeting System Using Multicast Technology

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ABSTRACT

Using a dedicated line for video conferencing is usually costly. A solution to solve this problem is to use a web-based video conferencing technology. However the existing webbased video conferencing technology needs too much bandwidth which makes two-way exchange of images too slow in the web environment. In this paper, a new web-based video conferencing system is introduced which has overcome this problem by using multicast method. The technique called tunneling which can preserve bandwidth enables this system to do multicast with minimum delay. Thus instead of using dedicated line-based video conferencing, web-based two-way multicasting technology is a better alternative.

Keywords: video conferencing, IP channeling, multicasting

1. INTRODUCTION

This article explains a web-based two-way multicasting technology. Web technology is used for many communication purposes. People post messages on the web board, and do chatting on a web environment. Due to the development of web cameras, nowadays many web surfers engage in multimedia chatting. In other words, people can conduct video conferencing through a web page. This method is definitely cheaper than non-web-based video conferencing which usually utilizes dedicated lines or satellites. This mode is called unicast which can not be used for multiple presentation of moving images in the same screen. In unicast mode one can only see one screen where a single moving image is projected. Of course it is possible to add multiple screens, however this requires separate lines, i.e., multiple number of unicast video conferencing systems. But it is also true that the unicast method provides high quality picture and no delays in projecting moving images whereas existing web-based multicasting method carries significant delays in showing moving images, which can result in irritation and inconvenience for participants. Furthermore two-way, or interactive conversation in the existing web-based multicasting systems is often slow and limited to just two parties; realtimesimultaneous multi-party conversation is usually not available. In this paper, the new web-based multicasting system that overcame the problem of "delay" in projecting moving images and allow real-time simultaneous multi-party video conferencing. This is possible through a technology called "tunneling" which reduces the delay time at the negligible rate. This web-based interactive multicasting system can replace expensive non-web-based unicast-style video conferencing technology as well as slow web-based existing video conferencing technology. With this system, one can not only do video conferencing but also broadcasting any video over the web page where the whole screen is divided into sections of showing participants' moving images. In other words, teaching a distance course with this system will cost much less than existing TV-based

method. Webbased learning has been around already for quite a while. But the problem of lack of interactivity and delays of showing moving images hindered further development in real-time multicasting-based distance education. This new technology will contribute a lot to distance education area by providing much cheaper and faster solution that can be interactive and multiparty-participation-possible. Web-based distance education is one of the most promising area in electronic commerce. And the success of web-based learning relies on the maturity of information technology infrastructure of the nation. There are studies showing the fact that the information technology infrastructure for electronic commerce is a key factor for the success of electronic commerce [1][2]. For example, high-speed Internet service available for most of the nation's population is a critical success factor for the rapid rise of electronic commerce in South Korea. Korea has been recognized worldwide as one of a few nations with highly developed information technology and Internet infrastructure. As for the highspeed Internet usage rate, Korea is reported as the number one country in the world. More than 10 million users subscribe to high-speed Internet services via such means as ADSL, VDSL, community LAN, and satellite. When taking the total number of Korean population into consideration, the high-speed Internet subscription rate in Korea is roughly 21% according to the Korean government ministry news [3]. This is a remarkably high usage rate when compared to those of other OECD countries since the average rate of highspeed Internet subscription in OECD countries is just 1.26% [4]. For many consumers in Korea, the Internet is just a part of their normal daily life. With the high-speed Internet available at very cheap price for almost all households, many electronic commerce firms flourish. Thus web-based multicasting video conferencing system is workable well in this highly-developed information technology infrastructure and web-based learning industry can be benefited much from this new technology.

2. WEB-BASED MULTICASTING VIDEO CONFERENCING SYSTEM

Web-based multicasting video conferencing system employs none Mbone router-supporting method. This method makes a different compared to the existing unicast-style video conferencing technology. In the existing technology, the system can not send multicasting data packet in M-bone supporting network environment. Regardless of support of Mbone by its routers, the web-based multicasting video conferencing system can send multicasting data packet by using tunneling technology. Figure 1 shows how tunneling technology works. In the existing method, data packets

are unicast from a server to a router and to a subrouter computer. In this way, two-way IP multicasting is not possible. However with IP tunneling technology the sub-router computer will recover data packets in webbased multicasting video conferencing system. This way also allows receiving data packets in reverse direction. Thus two-way IP multicasting is possible in the new system. What makes the new system superior is the fact that the time delay of showing moving images is less than 0.5 second, which means that the time delay is almost negligible. Figure 2 shows an actual example of video conferencing screen using the new system. In this example, 6 people are participating in two-way realtime video conferencing.

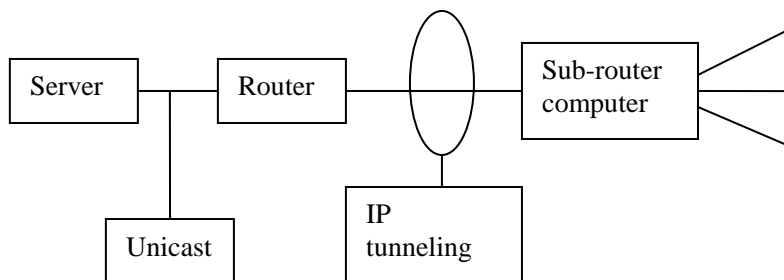


Figure 1



Figure 2

3. CONCLUSION

This system is a better system compared to the existing

system since it solves the bandwidth problem. In the existing unicast system multi-party meetings need too much network bandwidth. Namely the size of bandwidth

of the unicast system is bandwidth per person * # of people **2. For example, when 10 people are using the unicast system, the system requires $128 \text{ kbps} * 10^{**2} = 12,800 \text{ kbps}$, which is too much for the network to serve without significant time delay. On the contrary, in the web-based multicasting video conferencing system, the bandwidth is preserved using IP tunneling technology. Thus data packet transfer is effective through sharing. The bandwidth calculation for the new system is as following: bandwidth per person * 4 * (# of remote sites). For example, when 10 people are using the web-based multicasting video conferencing system, the system requires $128 \text{ kbps} * 4 * 1(\text{one location}) = 512 \text{ kbps}$. In one meeting room with two remote connection, $128 \text{ kbps} * 4 * 2(\text{two locations}) = 1,024 \text{ kbps}$. Thus no matter how many people are participating, the bandwidth of the new system is not affected by it. This is why the new system generates almost no time delay. The webbased multicast

video conferencing system can accomplish effective use of broadband Internet and provide high-quality video conferencing. This system will play an important role in promoting national IT infrastructure for distance learning industry which is rapidly growing in Korea.

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