3S-05 Error correction mechanism on broadcasting network – evaluation using simulation – *

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1 Introduction

Recently, we can see advancement on digital TV broadcasting using satellite broadcasting and ordinary TV broadcasting with Virtual Blanking Interval (VBI) technique to broadcast data. All of this comes to conclusion that digital data broadcasting is not so far away.

Our work shares common background with research about broadcasting network[1], which focuses on experimentation. This paper focuses on simulation especially in large-scale environment, which cannot be known under experiment.

This paper is an evaluation of proxy server's response characteristics on large scale broadcasting network in the intermittence error occurrence situation. We create a simulation environment to see how the system behaves on error condition.

2 Simulation System

We are using Parsec [2] simulation package as our simulation platform. Thanks to Parsec design, we can focus more on the design of the system's simulation rather than to divide our focus more to programming and design.

The system's simulation schema is showed on figure 1. There are three main objects (or entities in Parsec's term), which are driver, server and user. In Parsec simulation environment, entity driver serves a purpose similar to the main function of a C program[3]. Execution of a Parsec program is initiated by executing the first statement in the body of entity driver.

Entity server serves as a proxy server that will process clients' request. Entity user are clients machine that request data to entity server after being initiated by entity driver. Entity driver will determine the number of entity client according to input data.

In this simulation, at first, driver creates server and users instance. Then acording to error interval which has been set in input data, driver activates every user to start requesting to server. After being activated, users start requesting 100 Kbytes data to server, and server process the request. Server sends the data back to every requesting client. Every client will measure time from requesting data until receiving the response from server. Then the measured time is sent back to driver to be processed.

After receive all the time data from every client, server start processing time to find the mean time for a single user. After all error that occurs for about 1 hour, simulation program produces mean time for a single user in error that occurs for about 1 hour.

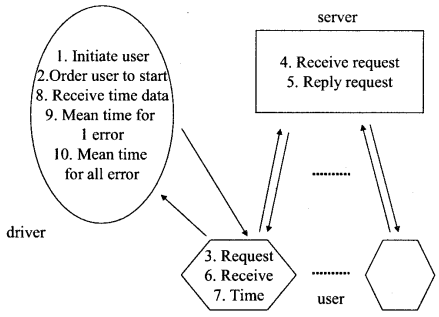

Figure 1: Simulation Design

3 Simulation Result

There is a possibility server cannot finish processing the requests in one error occurrence before another error occur and clients start their request on data to server. When it happen, average processing time will

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be longer than usual because new request will have to wait the server finish previous request. The best performance is achieved when the server reaching a condition just before the phenomenon happens. In figure 2, there are a few point of culmination from one graph inclination to another graph inclination.

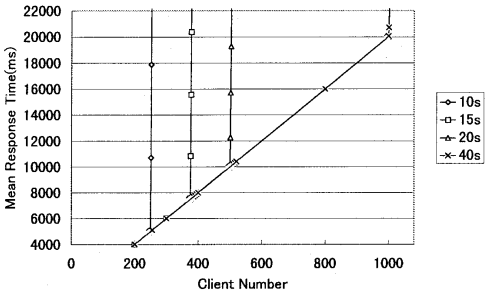

Figure 2: Mean Response Time between Error Interval from 10s to 40s

Figure 2 shows the mean response time between error interval from 10s to 40s. We can see that in error interval 10 second the best performance the server can achieve is 250 clients. In error interval 15 second, the best performance is 375 clients. In error interval 20 second is 500 clients, and in 40 second is 1000 user.

In user interface world, it is said that user can wait no longer than 2 second. In our research, the principle cannot apply intact. That is because in our proposed system, user doesn't interact with the server directly, but the client machines that detect an error will contact the server automatically. Thus, the wait time will be longer than 2 second. We assume wait time 5 to 10 second will not make user experience's dreadful.

In figure 3 we can see error interval 20 second in more detail. According to our simulation, error interval 20 second is has 10 second mean response time, which is the maximum mean response time according to our assumption. Therefore the maximum number that one server can afford is 500 users.

4 Conclusion

We can take a conclusion that 500 users is a maximum user number for every one-proxy server. Bigger user number will result in poor service quality.

In large-scale implementation, this means that for

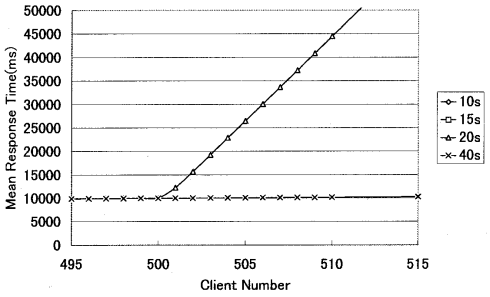

Figure 3: Mean Response Time between Error Interval 20s

every area with 500 users, at least one proxy server should be put in place to handle request. This will make user still have good quality experience when using the data broadcasting service.

Reference

[1] 鈴木健, アフマドルリィ, 辻順一郎, 岡田謙一. 放送型ネットワークにおける通信エラーの対処方式–実プロキシーを用いた評価–. 60 回全国大会, 情報処理学会, March 2000.

[2] University of California Los Angeles. Parsec simulation package. http://pcl.cs.ucla.edu/projects/parsec.

[3] Richard A. Meyer. *Parsec User Manual Release 1.1.* University of California, Los Angeles, August 1998.