# Upgrade the Machine Status Broadcast System by PHP Framework

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## Abstract

To improve the display quality and enhance expandability of machine status broadcasting, the existing cable TV system will be replaced by web based interface to broadcast the machine status display via computer network. Web browser is used to easily access the machine status display page without installing other toolkit. Thus we implement a broadcast system by the PHP framework on Linux server to show main machine status, trend plots and images. Then we use a thin PC (loaded OS and browser) with LCD TV to show the full-frame display page. By means of it, the machine status display is clearer to be observed. On the other hand, to reduce impact on network bandwidth, we avoid using the additional applet to aggravate the network bandwidth. Our design will be based on low network loading to upgrade the machine status broadcast system. Moreover we will measure the variation of network throughput to learn the effect of numbers of accessing clients. According to the measurement result, we can estimate the relation between the network loading and numbers of accessing clients.

## Introduction

- The machine status broadcasting system is used to show the current operation status of the Taiwan Light Source (TLS, a 1.5 GeV synchrotron light source). The existed machine status broadcasting system was implemented by the cable TV system for more than 15 years ago.
- For improving the display quality and enhancing expansibility, the machine status broadcasting system adopts the network interface to upgrade the machine status display.
- The upgraded machine status broadcasting system is implemented by the Web interface to display via network browser without any other toolkits or applets, it utilizes the PHP framework to achieve the broadcasting system and applies the AJAX (Asynchronous JavaScript and XML) mechanism to combine with the PHP.
- The display of Web based broadcasting system shows the main machine status, trend images and information of seminar announcements. Our upgrade design is based on the low network traffic, the better display quality and avoiding the use of additional applet to aggravate the network bandwidth.

## System Architecture of the Web-Based Machine Status Broadcasting System
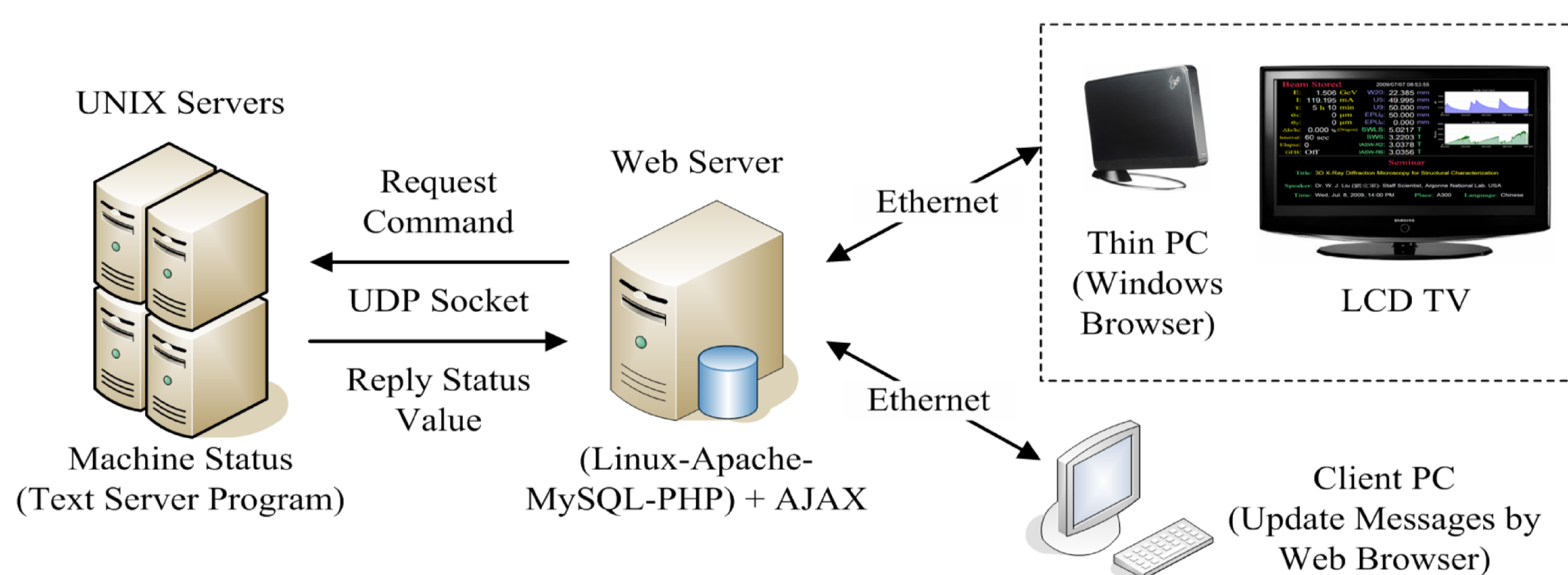


- Web based machine status broadcasting system take the LAMP (Linux-Apache-MySQL-PHP) platform as the client-server architecture.
- The AJAX mechanism is used for updating changed data without reloading all frames in order to abate the network traffic of Web applications on the client-server effectively.
- Use a thin PC which loaded the operation system and the Web browser, and combined with a LCD TV. The screen of LCD TV is shown from the full-frame Web browser page to display the main machine status, trend images and seminar announcements and also got better display quality.

## PHP and AJAX

- The AJAX structure is the JavaScript language which embedded into PHP program, and used to be the background process to deal with routine tasks.
- A client requests the PHP webpage from the server, and the server will response the webpage embedded HTML and JavaScript. The background operation of client-server will be processed by JavaScript to request and response.
- As the data changed or the update time expired, the background process of client requests to update the data to the server, and the server will send out the requested data to update the specific field at the PHP webpage without reloading all the data.
- The data updated method of AJAX has the lower network traffic than general webpage with renewing overall components in each webpage frame.
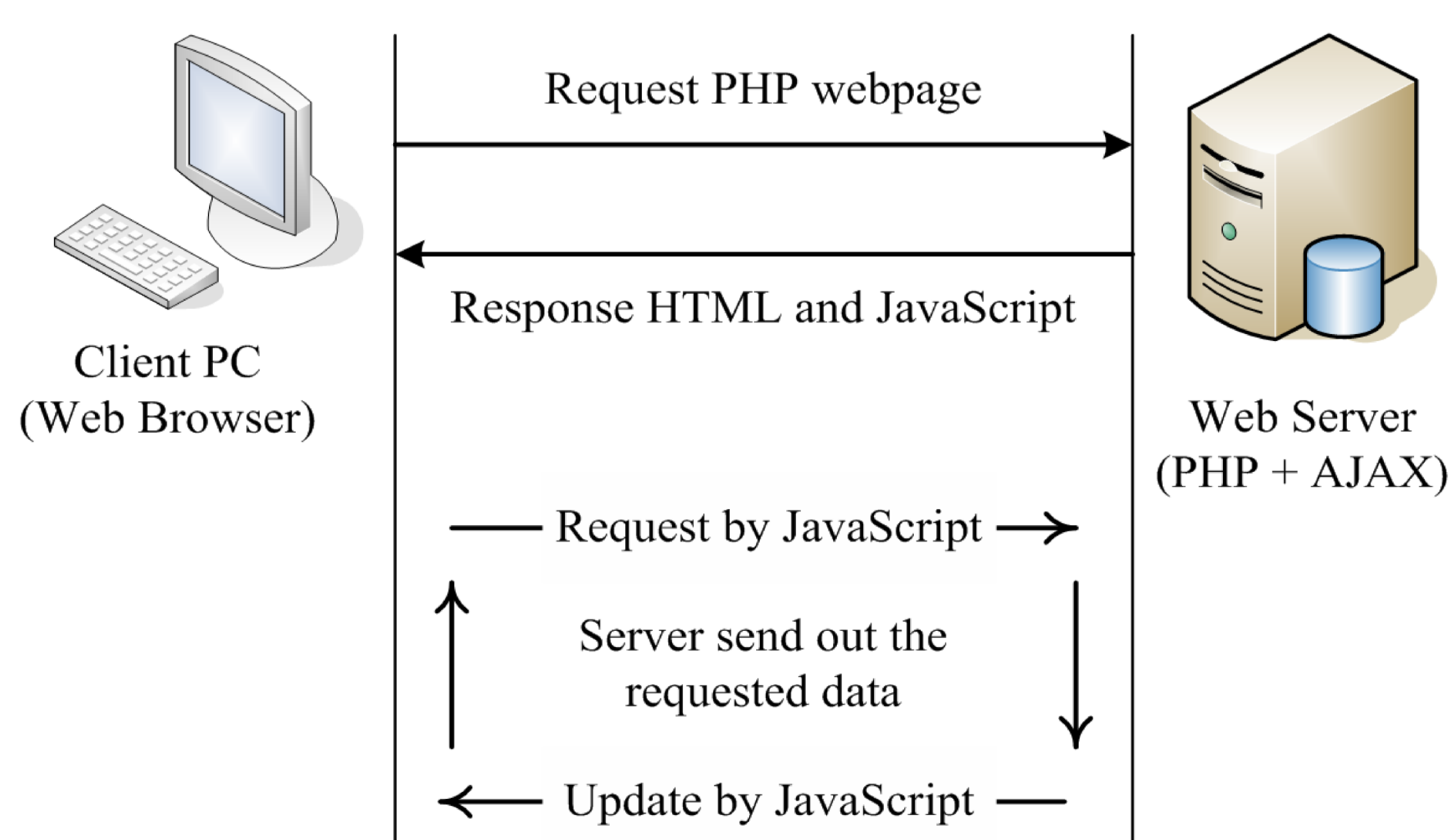


## Web Based Seminar Announcement

- MySQL database stores the broadcasting of seminar announcement. The client-side Web browser can update and edit the information and broadcasting announcement.
- After certain lifetime, the seminar announcement entry is removed from the active state.
- The seminar information is in table form, and it is easy to edit. Management via Web interface for the seminar announcement is much more convenient.
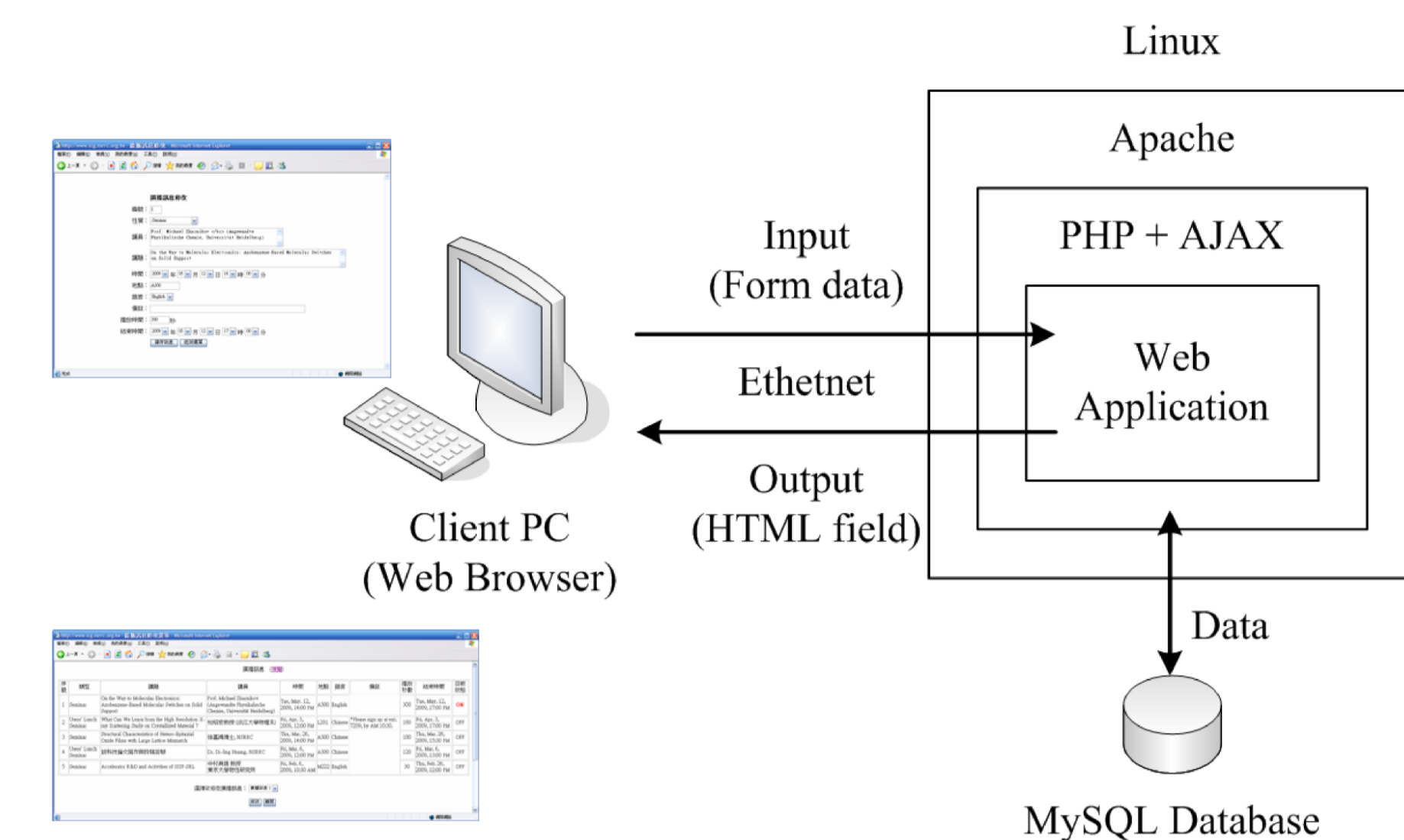


## Trend Image

- The trend images has been ploted for 12 hours record values of beam current and beam lifetime.
- At the Web server, the buffer data array is created to store the acquired timestamp and values of beam current and beam lifetime per second through the PHP program with AJAX mechanism.
- To change the static plot packet to dynamic display the program adds a timer method to update the trend image to reload new data records.
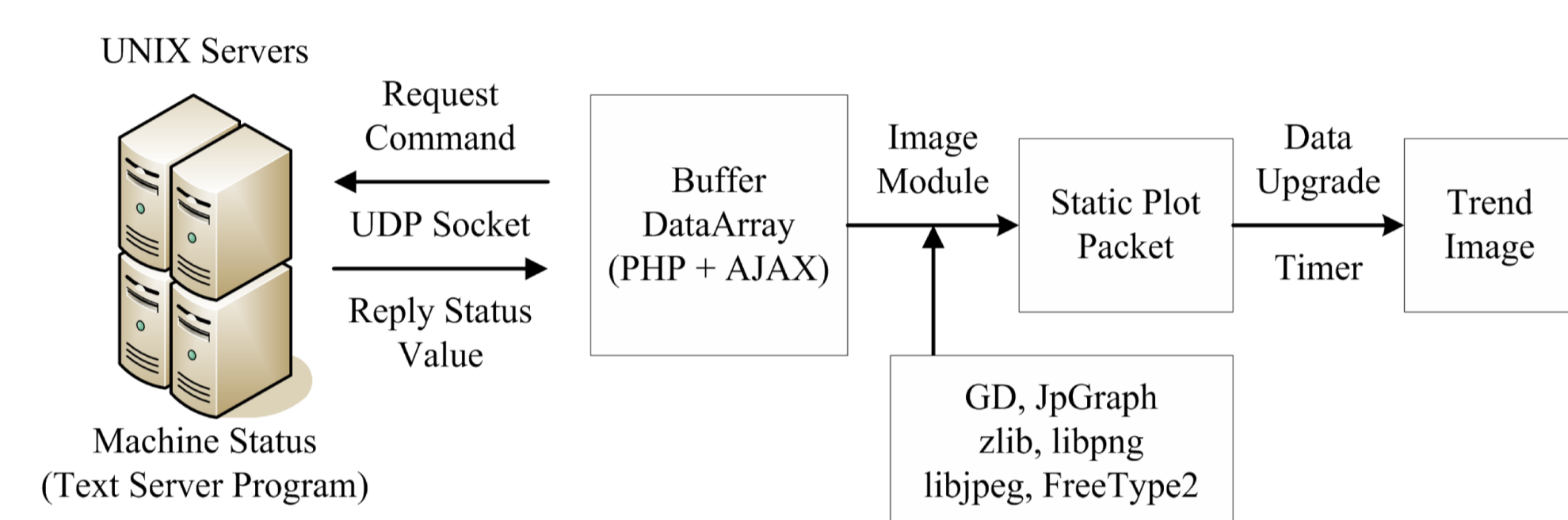


## Performance Measurement

- The Speed Meter toolkit is used to measure the cumulative average network throughput of a client-server with the web based broadcasting system in an hour.
- The average incoming and outgoing throughput are $6.5KB/sec$ and $7.49KB/sec$ so that low network bandwidth is needed.
- Evaluate that the network usage rate is less than $1\%$ of the network bandwidth. This traffic is negligible and will not degrade the network performance.
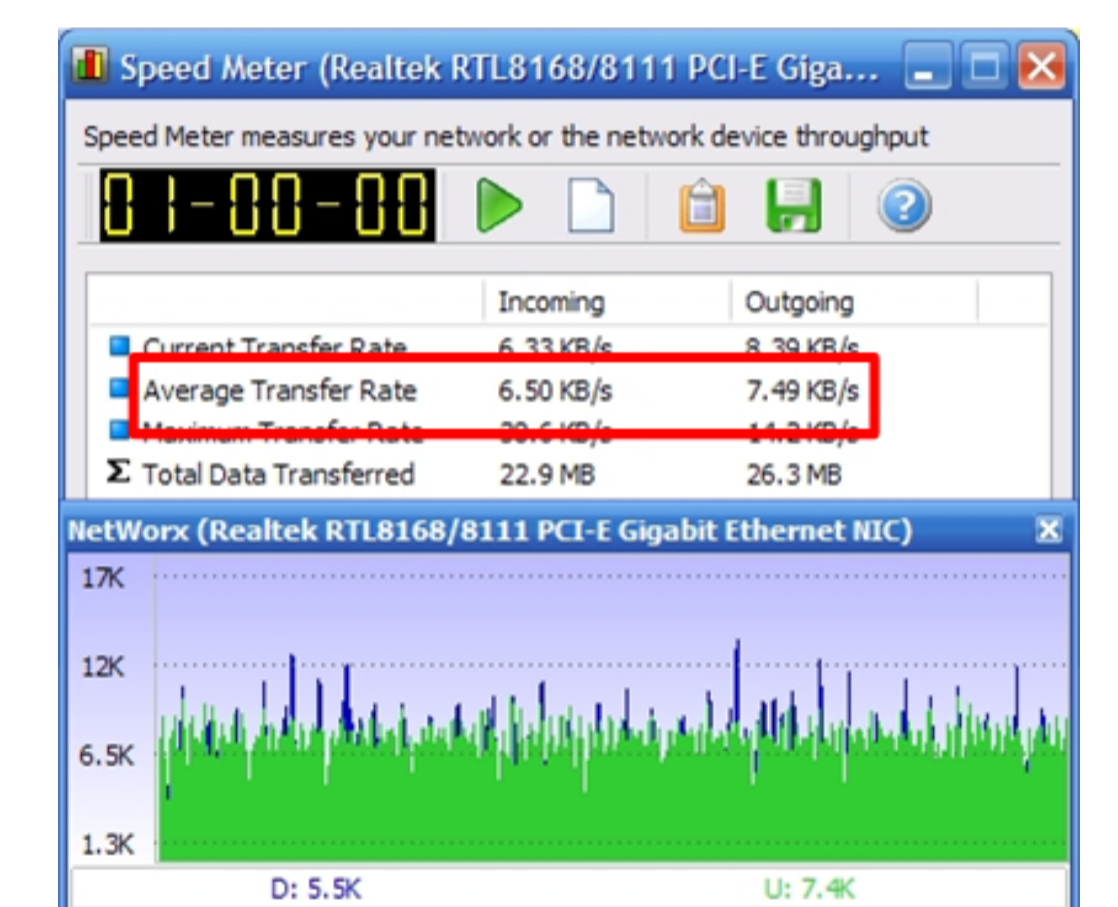


## Current Status
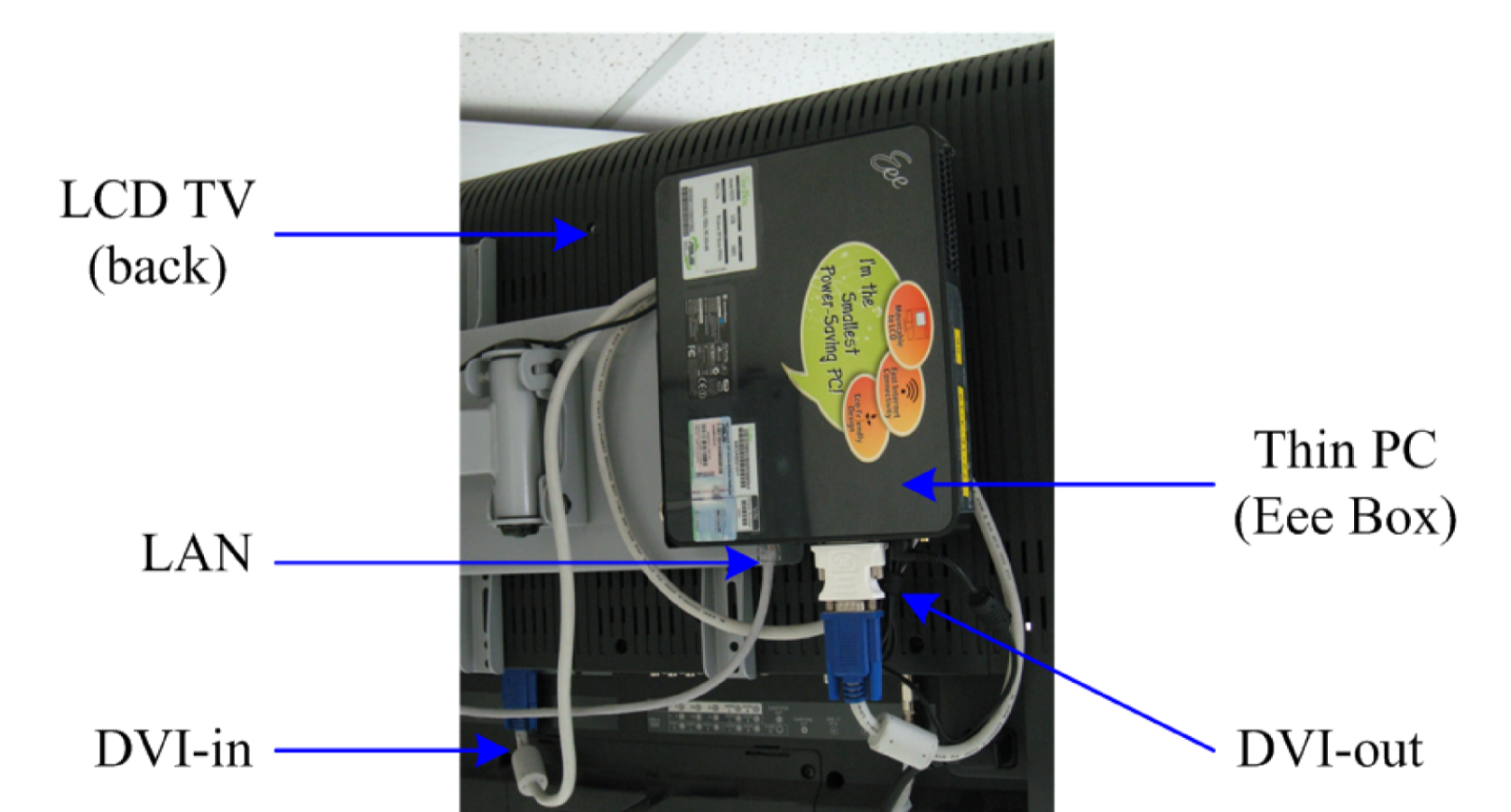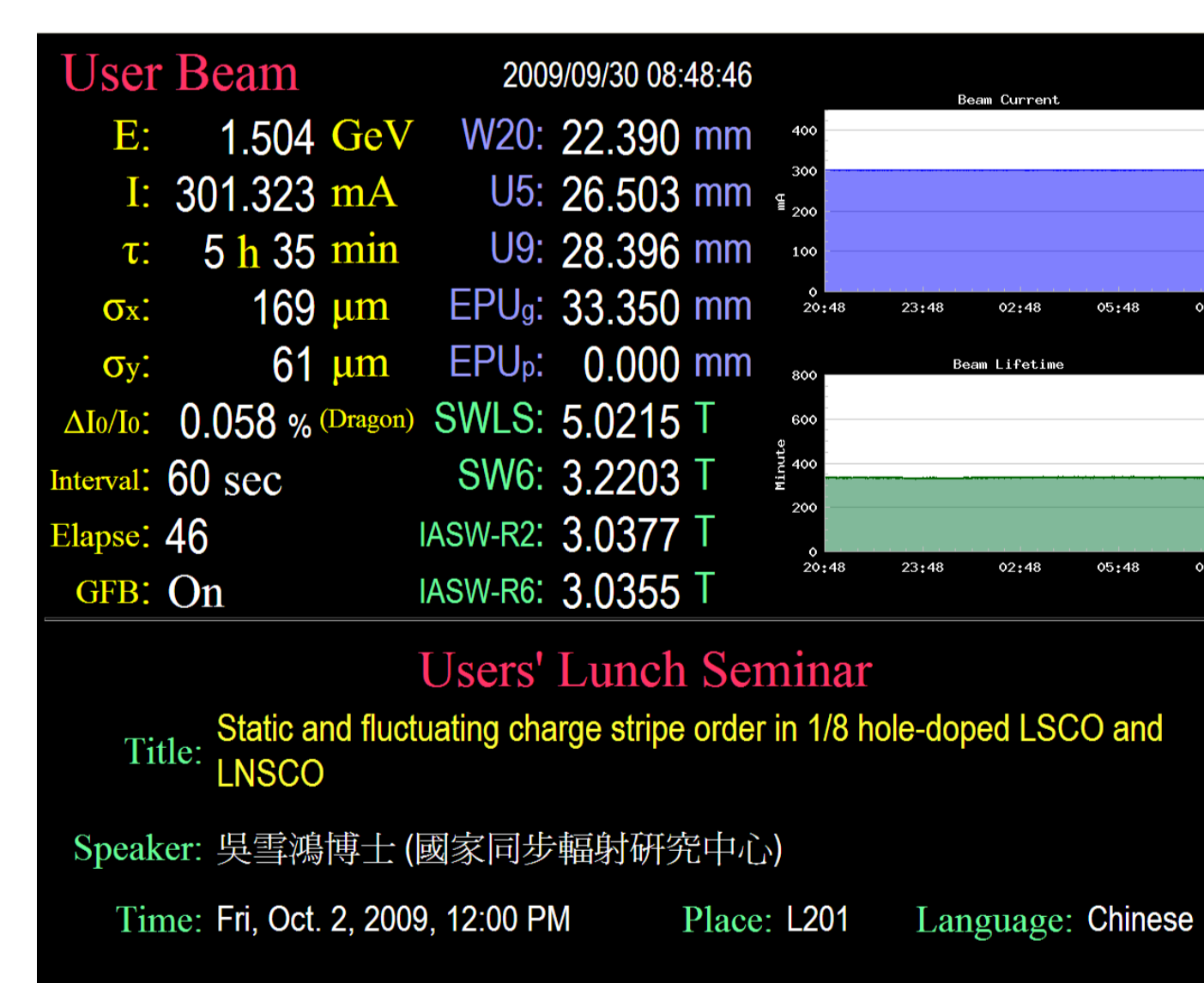


- The display is divided into three parts: TLS operation machine status (upper-left corner), Beam current and lifetime trend for last 12 hours (upper-right portion) and the lower part shown meeting, seminar, and colloquium announce information.
- The display can be combined English and traditional Chinese, and accessed via the intra- and inter- net by standard web browser. A LCD TV displays the full-frame webpage at specific locations around the NSRRC buildings.

## Summary

- Due to the limited display resolution of the existed analogue CATV system, it cannot display all necessary information in one screen; and many channels are needed to deliver variety information for different users with different preference.
- Based upon the advanced of computer network and low cost high resolution display available, new webpage design can provide comprehensive information in one page, and can satisfy most of users requirements.
- Current webpage implementation provides a low cost solution and better access environment without special and costly equipments. It is better than using another technology (IPTV, digital TV and etc.) in every aspect included cost and convenience.

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