

most such systems are still based on proprietary platforms and are too cost prohibitive to justify large-scale deployment.⁵ In November 1996, we developed an Internet/Intranet- Based Picture Archiving and Communication Systems (IPACS).⁶⁻⁸ It enables physicians to view, handle, and analyze medical images of patients directly in a web browser.

The New Generation PACS - The IPACS

Recently, the Internet and Intranet are becoming more popular for many real- world applications. By combining an array of technologies including 1) Internet/Intranet, 2) Asynchronous Transfer Mode (ATM) network, 3) parallel processing, and 4) distributed multimedia database systems, we developed a new generation PACS -- the IPACS. The IPACS provides an infrastructure for various kinds of medical image retrieval. It can be used through the hospital Local Area Network (LAN), telephone, Integrated Services Digital Network (ISDN), and Internet.

The IPACS is divided into 2 parts: data acquisition and information browsing. The data acquisition part of IPACS contains a frame grab module and a report formulation module. The frame grab module takes a snapshot of endoscopy/sonography signals and converts these signals into image files. The report formulation module is used to define the reporting forms for a variety of examinations. Image files and text reports are archived in an image server and database server, respectively, for study. The information browsing part of IPACS is a client/server system; its architecture is

shown in Fig. 1. The client can be any kind of web browser, such as Internet Explorer, Netscape, etc. The operation system of the computer can be Microsoft NT/95/98 or UNIX; it is platform independent. The server is a Microsoft Internet Information Server; the transmission between client and server uses standard Hypertext Transfer Protocol (HTTP).

This multimedia-assisted and client-server medical database system brings several benefits to users in the hospital. First, it helps physicians get medical images more efficiently thus shortening the time for diagnosis. Second, physicians can use any client PC connected to the IPACS, either locally or remotely, to review patient related information and images. Third, authorized users in other hospitals can use leased-line, ISDN, or dial-up services to link to the IPACS and review the stored multimedia patient information. This opens new possibilities of medical collaboration with field experts in other hospitals domestically or internationally.

Current Status

We have successfully transferred all endoscopic images and sonograms to the IPACS since November 1996. In our hospital, there are about 52,000 endoscopic images captured per year. This alone translate into annual savings of US\$100,000 compared to printing out these images with thermal dye-transfer printers on coated paper.

Based on the IPACS, we established a web-site "Clinical Infostation" (Fig. 2) which contains: 1) IPACS for digestive endoscopy and sonography, 2)

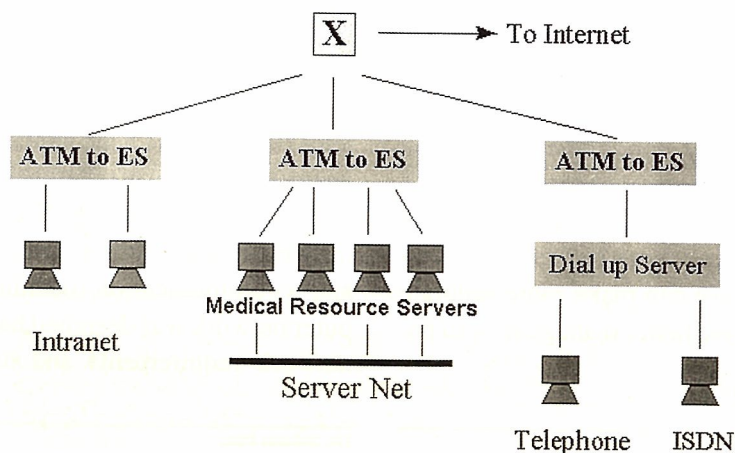


Fig. 1. Architecture of IPACS. ATM to ES = ATM to ethernet switch.