REPETE2: A Next Generation Home Telemedicine Architecture

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***Abstract**: As the availability of home broadband increases, there is an increasing need for a broadband-based home telemedicine architecture. A home telemedicine architecture supporting broadband and remote training is presented.*

Background: Due to low availability of broadband in the home, home telemedicine projects have typically focused on the use of conventional telephone lines. Broadband penetration has been increasing rapidly in not only urban areas, but also in rural areas. In 2005 rural home broadband access penetration was 18% and increased to over 25% in 2006 [1]. Providing training to use a home telemedicine unit (HTU) is difficult due to high travel times in the rural environment. In addition, complex HTUs can be unreliable and hard to maintain, requiring frequent visits by technical support personnel. An effective approach in the telemedicine environment for reducing these problems is to use remote training and support [2, 3].

Architecture: Based on these trends, a proposed telemedicine and remote training architecture based on thin-client technology, the REmote Patient Education in a Telemedicine Environment Architecture Version 2 (REPETE2), was developed.

In this architecture, application logic for the home telemedicine unit (HTU) is hosted on a remote server. Access to application logic is provided through the use of a remote display protocol (RDP) over a broadband wide-area network (WAN) connection. Data from peripheral devices, such as video cameras, glucose meters, blood pressure meters, or other medical monitoring devices can be attached via Universal Serial Bus (USB) to the thin-client HTU. Data from these USB peripheral devices can be remotely transmitted to the remote server over internet protocol (IP). This architecture has a number of benefits. The architecture greatly simplifies the technology placed in the home and at the desktop of the provider, which should increase the reliability and reduce the maintenance requirements of the HTUs and provider workstations. The HTU can also be connected via a Wi-Fi connection, allowing the HTU to be placed in a variety of locations in the home.

REPETE2 also supports remote training through the use of a software remote control protocol (RCP) viewer. This software RCP viewer allows the trainer to connect to the patient's HTU workspace as an additional client on the telemedicine user server. Through this mechanism, the trainer can observer and take over the patient's HTU session. Therefore, the trainer and the patient share the same session and have a shared workspace.

Evaluation: We conducted two preliminary studies examining the performance of RDPs in high bandwidth environments. The first study examined using an RDP in a wide-area network [4]. The second study investigated the performance of RDPs on a PDA device over Wi-Fi as an analogue for a thin-client HTU [5]. These studies taken together indicated that an appropriately designed RDP could provide the performance needed for use over a broadband telemedicine environment.

Discussion: A thin-client based home telemedicine architecture supporting broadband and remote training for patients is presented. REPETE2 moves the complexity of the end-user devices to a remote server, increasing the system reliability for the end users. Two studies were done demonstrating the feasibility of the proposed telemedicine architecture.

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