January 22, 2007

Mr. Lakshman One
School of Engineering Science
Simon Fraser University
8888 University Drive
Burnaby, BC V5A 1S6

Re: ENSC 440 Project Proposal for Internet Media Streaming on TV

Dear Mr. One:

Ensight Solutions would like to present to you our proposal for the ENSC 440 capstone project, outlined in the attached document, *Proposal for Next Generation IPTV Set-Top Box*. The objective of our project is to realize an application running on an ARM/DSP development board in order to display internet media streams on a standard television without a personal computer. This project is done under the guidance and support from Dr. Farid Azhar of Varietize Technologies.

This proposal describes the motivation for this project, its goals and milestones, an estimated budget, a timeline for completion, and information about our organization.

The company comprises of four undergraduate engineering students: Allen Lai, Pui Kang Kwok, David Shen, and Jimmy Jeong. If you require more information, please do not hesitate to contact me by phone at (778) 883-3376 or via e-mail at ensc440-group10@sfu.ca.

Sincerely,

Allen Lai
President and CEO
Ensight Solutions

Enclosure: *Proposal for Next Generation IPTV set-top box*

ENSIGHT solutions

PROPOSAL

NEXT GENERATION IPTV SET-TOP BOX

Project Team: Allen Lai
Jimmy Jeong
David Shen
Pui Kang Kwok

Contact Person: Allen Lai
alaib@sfu.ca

Submitted To: Lakshman One – ENSC440
Steve Whitmore – ENSC305
School of Engineering Science
Simon Fraser University

Submission Date: Jan 22, 2007

Executive Summary

"We call it IPTV. And no doubt this is where the world is going."

Bill Gates
Chairman, Microsoft

IPTV is a system where users are able to view TV contents over the public internet. In essence, IPTV contains two segments: live broadcasts and stored broadcasts or Video on demand (VOD) in which users are able to stream contents after they are downloaded. Ever since the first successful live webcasts started by a radio station back in 1998, this technology had been steadily increasing in existence and making its way into households worldwide due to its simple compatibility with only an Internet connection and a network detecting device such as a personal computer (PC), or 3G mobile cellphone. With high bandwidth broadband now readily available, the restriction of low broadband penetration in the past is all but eliminated, therefore adding to the market growth of this technology segment. It is estimated that more than 100 million households will be exposed to IPTV worldwide, and telecommunications, TV broadcasters, schools and corporations alike are all utilizing this technology to increase revenue opportunity, maintain lower costs, or simply for convenience and efficiency. As of June 2006, there are over 1,300 free IPTV channels available and many more that are fee-based.

With the above mindset, Ensight Solutions is confident our innovative objective will provide superior values to our customers through a combination of developing technologies from embedded software for media streaming, audio/video processing, networking and real-time embedded system. Our company proposes the application of displaying IPTV broadcast streams directly on a standard TV set without using a PC. Such an idea will be a cost effective way of integrating IPTV into its utmost usage potential with a full range of hardware (TV's) thus providing the customer with multiple viewing choices within a household based on only one technology and possibly eliminate the use of tradition cable/satellite system in the near future.

This document encompasses Ensight Solutions' goals and strategies to conquer this initiative with a proof-of-concept prototype. Our company consists of four talented sixth-year engineering science students with experience in software design and testing through various co-ops and course studies in different disciplines. Supported and supervised by Dr. Farid Azhar of Varietize Technologies and advised by Dr. Ivan Bajic, their combination of knowledge and expertise will assist us in achieving this ambition.

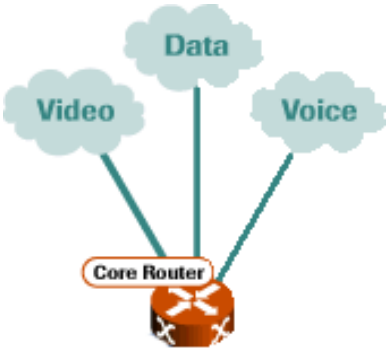
Over the span from January to April 2007, our engineering team will conduct the necessary research, design, and implementations associated with this design, with a scheduled completion date for the proof-of-concept demonstration near the beginning of April. We envision our project to have a tentative budget of $760, which we plan to fundraise through the ESSEF and Kaiser funds which will be detailed in the budget section of this document.

Table of Contents

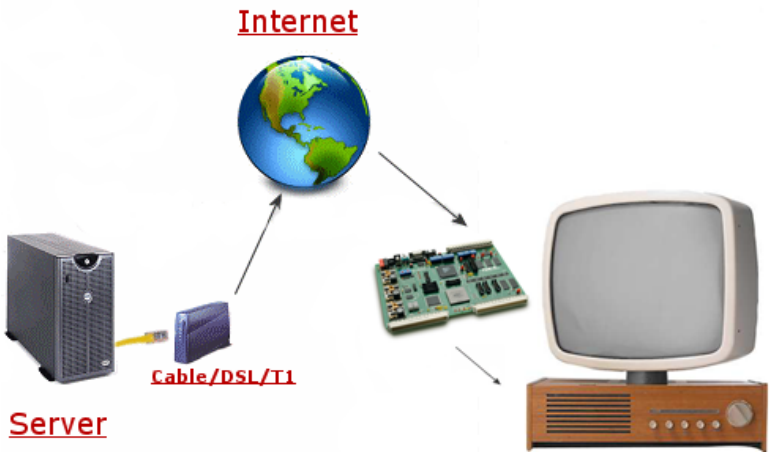
1 Introduction

For the past decade, the television world has witnessed the increase in satellite service, digital cable, and the arrival of cable HDTV. The newest member to have an impact on the television world is the delivery system known as Internet Protocol Television (IPTV). IPTV is the service of providing a video stream as internet protocol packets, which can be displayed on your television set. Already, large telecommunication companies are investing money for the development of this service. IPTV technology will be part of the future household, and Ensight Solutions will be a leader in bringing us closer to that goal.

The "Triple Play" in communication services is broken down into voice, data, and video. Telecommunication companies which previously only provided phone services are attempting to enter into the TV market. Billions of dollars are being invested into IPTV by big players such as Microsoft and AT&T. Their goal is to be the sole provider for all communications in the house, and IPTV is a major component of their plan.



And IPTV is growing! In 2005, there were 3.7 million subscribers to IPTV, but Multimedia Research Group estimates that by 2009, this number will have increased to 36.9 million worldwide. Such numbers in subscribers would mean that revenues would be near US$10 billion. The time to enter into this lucrative and expanding market is now.



The objective of our project is to develop a stand-alone setup module, which consists of an ARM/DSP development board that can read audio/video media from the internet, and displays it on a TV attached to the board's peripherals. Currently, the ARM/DSP development board supports only a limited number of audio and video CODECS, none of which support Internet media format.

The project will involve porting and integrating some open-source streaming applications with the existing software. The development environment is in C/C++ with embedded Linux platform based on highly integrated system-on-chip (SoC) dual processors (C6000 DSP and ARM9) system.

This document is a proposal containing the system overview of our product, the design, references of research, project scheduling, and funding information.

2 System Overview

Figure 2-1 shows a brief system block diagram of our design. It consists of three major components: Central Control Unit, a DSP chip for video processing and an output block. The video/audio contents first arrive from the wired or wireless network. Secondly, video data will be decoded by the DSP chip and audio data will be processed in the CPU. After decoding, both video and audio data will be sent to the output block and displayed on normal TV. In our design, CPU will control the whole system and response to the user input.

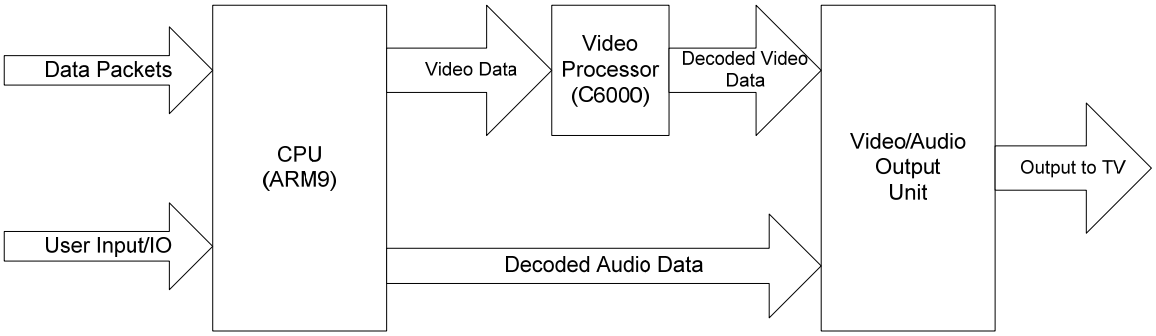


Figure 2-1: Block diagram of Ensight Solutions IPTV design

2.1 Proposed Design Solution

Our proposed solution is to build a set-top box that can stream internet video content to normal TV. Such a device can provide user Video on Demand (VoD) services, low latency video streaming, high quality video contents and an interactive entrainment experience. The highly integrated system-on-chip (SoC) dual processors (C6000 DSP and ARM9) system provide an application specified platform on delivering brilliant video and audio contents. Also with its low cost of approximately US$29.00, the chip highly reduces the manufacturing costs of our set-top box, therefore, increasing our market share amongst our competitors.

Limited time and funding are the major constraints in completing our project. Within the next three months, our project needs to be completed and the funding secured. Under these constraints, we will build a set-top box that streams Standard Definition (SD) quality video on TV.

By devoting more resources in research and development, we would further enhance our the function of our set-up box. Our future goal is making IPTV capable of streaming high

definition video content. Also, by upgrading the existing hardware, our system will be able to handle real-time video conferencing.

3 Budget

Table 3-1 depicts our tentative budget status at the start of our project in January 2007, which will be subject to change during the course of the allocated three month completion period:

Table 3-1: Tentative Budget

Equipment	Cost
System-on-chip dual processors development board (C6000 DSO and ARM9)	$600
IR Receiver	$10
Audio/Video Decoder	$50
Cables/Connectors/PCB	$100
Total	**$760**

Table 3-1 only provides an estimate list of equipment and costs for the initial stage of the project. The costs are overestimated by 10% to provide miscellaneous contingencies such as shipping and shortage of parts.

3.1 Funding

Similar to any start-ups, the main sources of funding of the initial capital costs of the design will be incurred by the company. Each member will provide an equal contribution to this funding, and in return, be awarded with equal shares of the company. All financial transactions will be recorded and taken into account in our finance department to make certain of proper reimbursements to individuals and third parties. With this in hand, we are confident that Ensight Solutions will be on a sure foot and have stability to the start of our financial situation. Furthermore, this allocation of shares ensures equal contribution from each member of the company.

Due to the cost of this project, other sources must be considered in order to make our objective a reality. Ensight Solutions is in the process of applying for the Engineering Student Endowment Fund (ESSEF) to alleviate some of the associated financial burden. The Kaiser Fund from the Engineering Science Department will be another possibility. We will also be pledging support from Dr. Farid Azhar at Varietize Technologies who will be overseeing the entirety of this project. We also plan to enter our project into competitions such as Western Engineering Competition (WEC) in the January of next year and from there forward. Likewise, if successful, we will also be lobbying for

royalties from Varietize Technology if our proof-of-concept is developed into a consumer ready application in the market.

4 Timeline

The Gantt Chart in Figure 4-1 shows our proposed schedule to complete the project.

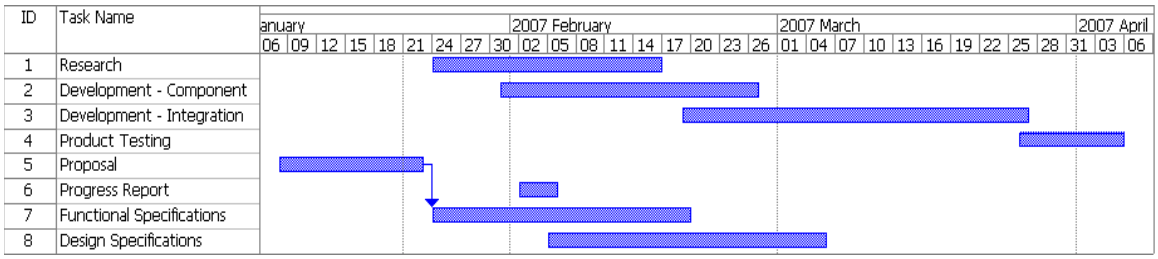


Figure 4-1: Gantt Chart

Table 4-1 contains the targeted dates of major milestones and deliverables for this project.

Table 4-1: Milestones and Deliverables

Date	Milestone / Deliverable
February 19, 2007	Completion of Functional Specifications
February 23, 2007	Completion of Component Development
March 5, 2007	Completion of Design Specifications
March 26, 2007	Completion of Integration
April 5, 2007	Completion of Product Testing

5 Company Info

Allen Lai – Chief Executive Officer (CEO)

Allen Lai is currently working towards the completion of his Bachelor of Applied Sciences in computer engineering at Simon Fraser University. Through his coursework, he has experience in software engineering and image processing in C and C++. He also has a background in electronics and CMOS VLSI design. Allen has experience with the product development life cycle through his internship at TELUS, and is currently the president of the Engineering Science Student Society. Outside of academics, he works as a volunteer marketing coordinator promoting the annual Vancouver Cherry Blossom Festival.

David Shen – Chief Financial Officer (CFO)

David Shen is a sixth year engineering student pursuing an undergraduate degree specializing in electronics at Simon Fraser University. He brings to Ensight Solutions team knowledge and industrial trends in IP based broadband networks through his current co-op with Redback Networks. Through his cooperative education exposures, he possesses experience in various industries and companies such as Electronic Arts (EA) located in Burnaby, BC and Advanced Telecommunication Research International (ATR) in Kyoto, Japan. Through coursework and projects, his skills include programming in assembly language, C++ and Java applications. He hopes to utilize these skills to assist Ensight Solutions in going forward to become a leader in the advancement of IPTV technology. His willingness to work as a team and open communications will be assets to both the team and company.

Pui Kang Kwok – Chief Technology Officer (CTO)

Pui Kang Kwok is a third year electronics engineering student at Simon Fraser University. Through his coursework, he has experience in modern multimedia processing in C and C++. He also has a background in electronics and real time embedded system design. During his work term in Spot Solutions Ltd, he possesses the knowledge on network infrastructure and Linux operating system.

Jimmy Jeong – Chief Operations Officer (COO)

Jimmy Jeong is a sixth year electronics engineering student at Simon Fraser University with a previous co-op term placement at Vtech Telecommunications Canada. Through his co-op, he gained practical experience with RF devices, as well as the electronic equipment used in their analysis. Jimmy has taken courses in Java, C and assembly language. As well, he is familiar with designing and implementing circuits at the logical switch and transistor levels.

6 Conclusion

Ensight Solutions is dedicated to developing and leading the changes to IPTV advancement in different applications in our daily lives. IPTV technology possesses many advantages and promises. Due to its standard networking protocol that is readily established over the Internet, it provides lower costs for operators of this technology and users alike (in most cases, free for users).

With the increased use and emphasis of integrating technologies such as computers and cell phones in our ever-changing lifestyles today, IPTV contains much potential for expansion compared to its alternatives such as traditional TV distribution through satellite or cable. With many significant advantages, such as users not needing to be

confined to a broadcast schedule but instead can watch what they want and when they want, the future of this technology is encouraging and offers unlimited possibilities.

This proposal highlights our target and approach in order to complete this project in the allotted three month time frame. The company is confident this application in IPTV is innovative with a clear advantage on the cost-benefit analysis. Ensight Solutions will become a successful player and contributor in the growth of IPTV advancement in order to become a leading company in this technology sector.

7 References

1. Wikipedia: *IPTV*. (http://en.wikipedia.org/wiki/Iptv)

2. W. Cooper and G. Lovelace. IPTV Guide Delivering audio and video over broadband, December 2006.

3. Ars techinca: *An introduction to IPTV*. (http://arstechnica.com/guides/other/iptv.ars)

4. Varietize Technologies. (http://www.varietize.com)

5. Texas Instruments: *TMS320C6000™ Imaging Developer's Kit Third Party Quotes*. (http://www.ti.com/sc/docs/news/2001/01013b.htm)

