

Exploring Solution for IPTV Transmission Issue

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ABSTRACT

Six month industrial training was obtained at Sri Lanka Telecom at Panadura from April 2010 to November 2010. Customers in a certain area have been facing some IPTV related issues. I was interested in identifying the cause of the problem and finding a solution for it.

IPTV, where television is distributed over the internet protocol in a single operator network, has become popular and widespread. Many telecom and broadband companies have become TV providers and distribute TV channels using multicast over their backbone networks. IPTV also means an evolution to time-shifted television where viewers can choose to watch the programs at any time. However, distributing individual TV streams to each viewer requires a lot of bandwidth and is a big challenge for Telecom operator. This paper describes how to overcome bandwidth utilization problem, alternative solutions, selection of best Feasible.

KEYWORDS: Bandwidth, IPTV, Internet Protocol, Multicast, Sri Lanka Telecom

INTRODUCTION

Sri Lanka Telecom (SLT) is the Country's leading Telecom operator. SLT as an incumbent operator has been responsible for providing both voice and data services, domestic as well as international. SLT has introduced ADSL; IPTV service along with copper access has been the major driver of SLT.

IPTV is defined as the secure and reliable delivery to subscribers of entertainment video and related services. These services may include, for example, Live TV, Video on Demand (VOD) and Interactive TV.

Live TV-with or without interactivity related to the current TV show;

- Time-shifted TV(TSTV): catch-up TV (replays a TV show that was broadcast hours or days ago), start-over TV (replays the current TV show from its beginning)

- Video on Demand (VOD): browse a catalog of videos, not related to TV programming.

Background and Rationale for the Research

SLT has been facing an IPTV related problem for past 4 months. SLT had received more IPTV issue from a certain area. When they watch TV during night time they get black marks on their TV screen. When they watch the Time shift TV (TSTV) compare to Live TV they will get more problems, they face such problems from 7pm to 11pm.

Research Objectives

The main objectives of the study were identifying and overcoming the main difficulties of providing IPTV connections in certain district for better multimedia communication.

DATA COLLECTION AND ANALYSIS

Basically three methods were involved in this case.

- Interviewing.
- Questionnaire

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- Secondary data.

In addition, most of the study time was spent by collecting research data on the ADSL internet connections, IPTV with the use of the ADSL tester.

DATA ANALYSIS

Table 1: ADSL Tester data

ADSL key parameters of certain area

Tel. No	Distance from MDF(km)	Parameter	Values	
			Up Link	Down Link
2262--	2.8	Link Rate(kbps)	133	3096
-		Maximum Rate(kbps)	1033	8251
		SNR margin(dB)	34	35.5
		Capacity %	13.4	6.2
		Attenuation(dB)	22	41
		Transmission Power(dBm)	6.7	14.5

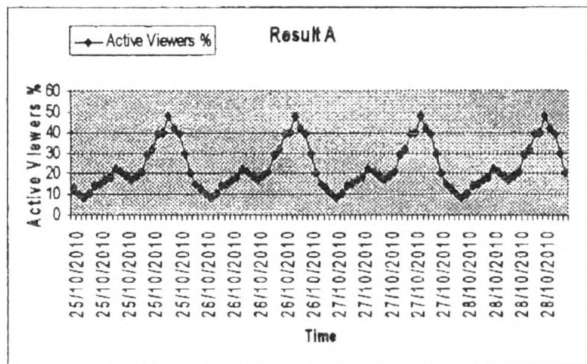


Figure 1: Active Viewer (%) VS Time

The data set also gives us information about the total number of viewers. Figure 1 shows the fraction of the viewers that are active and how it varies over the three days. There are distinct peaks in the evenings when 40-48% of the viewers are active.

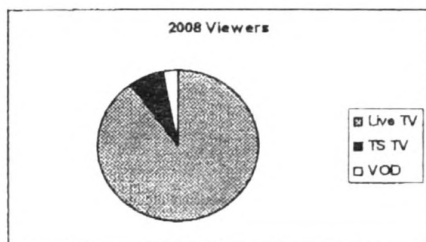


Figure 2: Number of viewers (Live TV, VOD and TSTV) in 2008

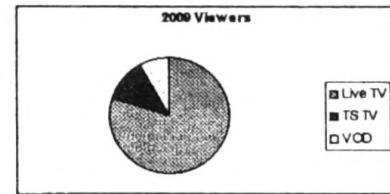


Figure 3: Number of viewers (Live TV, VOD and TSTV) in 2009

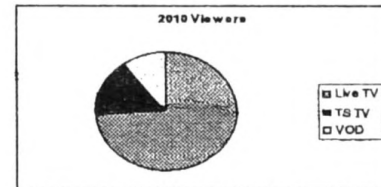


Figure 4: Number of viewers (Live TV, VOD and TSTV) in 2010

Above 3 figures (2, 3 and 4) contain SLT pass data, It shows Number of Live TV, VOD and TSTV viewers in 2008, 2009 and 2010.

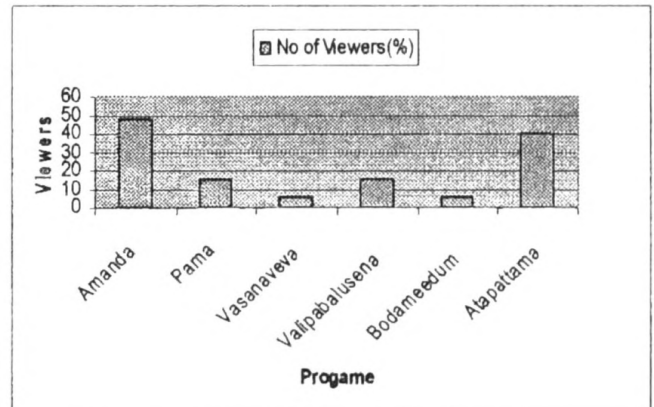


Figure 5: Viewers Vs Programs

To plot this graph, 50 Programs were tested among certain area customers to identify the more interested programs. Only some high demand programs were plotted (From 50 programs) in this graph. (It was plotted by using data from research question)

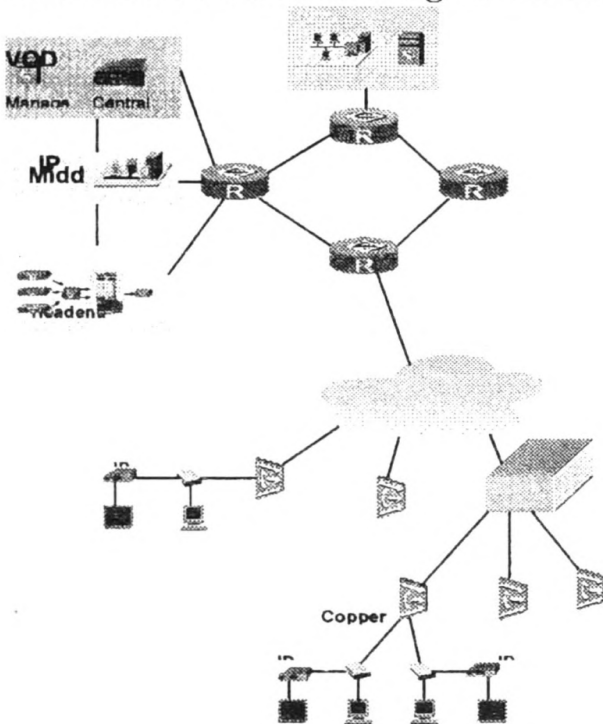
RESULTS

Result 1: Table 1 gives us following information (It indicates only 1 customer information); required parameters (SNR, Link rate and Attenuation) for IPTV values are outstanding at the customer end.

Result 2: Figure 1 gives us following details; More Area X customers view the programs from 7 P.m to 10 P.m that means peak hours between 7p.m and 10 P.m

Result 3: Figure 2, 3 and 4 give us following details; Interactive services (VOD and TSTV) are increased year by year. Result 4: Figure 5 indicates; some programs (Amanda, atapattama and pama) which are viewed by more customers

Overall IPTV Network Diagram of SLT



Above Diagram was divided in to 3 cases, analyzed with help of Research result to identify the root cause of problem.

Case1: From Customer Premise to Digital Subscriber Line Access Multiplexer (DSLAM) (There was no problem .It was proved by using ADSL Tester value and some Theory)

Case 2: From DSLAM to MUX (This is a problem area)

Case 3: From MUX to Core Network (There was no problem .it was proved by Research result)

CAUSE FOR THE ISSUE

When a customer views the interactive services, such as VOD and TSTV, high band width is wasted between MUX and DSLAM because those are transferred by using Unicast method.

Research result provides us the following information, TSTV and VOD services increase year by year. When TSTV and VOD demand increase high bandwidth utilization increases between MUX and DSLAM. When interactive demand increases congestion may occur between MUX and DSLAM due to limited bandwidth.

SOLUTIONS FOR THE PROBLEM

1. DSLAM connect with Metro Ethernet Network (MEN)

Each and every DSLAM should connect every Metro Ethernet Network Switch. IF Area x DSLAM connects with MEN directly bandwidth can be increase. Congestion can be reduced this way. This is a good method because implementation is very easy.

2. Caching strategies

Research result provides us the following information, only some programs are viewed by more customers. If those programs can be cached at DSLAM then we can reduce the bandwidth waste between MUX and DSLAM

3. Cisco Visual Quality Experience (VQE) Technology

This Method protect against congestion

4. Re Transmission

In order to overcome this problem we can introduce retransmission technique from MUX.

DISCUSSION

SLT has been facing complaints from Area X. I found an IPTV issue from certain area. I prepared some research questions and checked Access Network quality from my

research result. I suggest when data comes from MUX to Area X DSLAM the congestion occurs.

So I decided to check the parameters/Bandwidth in "last mile" (Access Network) and prepare for the Research question. From my research result I proved, when demand increases at night time, congestion occur between DSLAM and MUX and also explained Video on Demand (VOD)/Time Shift TV (TSTV) will take more bandwidth space.

Similar problem can occur at other DSLAM areas too (which DSLAM connect MUX).

Implementation of caching at each and every DSLAM is impossible. SLT must keep enough bandwidth between DSLAM and MEN to avoid congestion in MEN it can implement Caching in MEN.

CONCLUSION

- Required parameters (SNR, Link rate and Attenuation) for IPTV values are outstanding at the customer end.
- More Area X customers view the TV programs from 7 P.m. to 10 P.m. that means peak hours between 7p.m and 10 P.m. (from fig 1)
- Interactive services (VOD and TSTV) are increased year by year. (from fig 2, 3 and 4)
- SLT can overcome above problem by connecting DSLAM with MEN Ring easily.
- SLT can reduce band width utilization (not only between MUX and DSLAM but also transport network) by using Peer to peer distribution. Caching is also one of the best methods to reduce the bandwidth utilization across the transport network.
- SLT can hold more customers with it and provide better service to customers due to reduced bandwidth utilization.

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