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Media Streaming in Peer-to-Peer Network

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***Abstract*—** P2P TV distribution is going commercial, and the Video quality delivered to users becomes of the utmost importance. Video-over-IP applications have recently attracted a large number of users on the Internet. Traditional client server based video streaming solutions incur expensive bandwidth provision cost on the server. This indicates that network-awareness is absent and also network behavior handling is difficult. Peer-to-Peer (P2P) networking is a new paradigm to build distributed network applications. Nowadays, P2P streaming has facilitated the way that people can receive the video content in. Scalability and availability can be considered the most advantages of P2P networking approach where many users can communicate simultaneously. Thus, in this paper, we are propose an approach which maintains the communications among peers and try to improve the QoS. The proposed approach will be effective on different parameters such as throughput, Delay, and packets loss ratio under different conditions.

Keywords: *P2P* Streaming, Video-on-Demand, *QoS, and Multimedia.*

I. INTRODUCTION

Streaming multimedia files to a large number of customers imposes a high load on the underlying network and the streaming server. The voluminous nature of the multimedia traffic along with its timing constraints make deploying a large-scale, cost effective, media streaming architecture over the current Internet a challenge [10]. The basic solution for streaming video over the Internet is the client-server service model. A client sets up a connection with a video source server and video content is streamed to the client directly from the server [1]. The major challenge for server based video streaming solutions, though, is its scalability. This makes the server based video streaming solutions expensive. Peer-to-Peer (P2P) networking has recently emerged as a new paradigm to build distributed network applications. The basic design philosophy of P2P is to encourage users to act as both clients and servers, namely as peers. In a P2P network, a peer not only downloads data from the network, but also uploads the downloaded data to other users in the network.

We have designed a test methodology to analyze in detail the video quality received at each peer in peer-to-peer (P2P) video streaming system [6]. The metrics that we employ at each peer include the amount of time to wait before video playback starts, nature of the data-paths established to serve the peer, protocol overhead and duplicate data received. These metrics are estimated by analyzing the packet reception times at each peer and utilizing information about the original uncompressed video as well as the encoded video. We use this framework to compare the performance of three P2P video streaming systems by deploying them on our controlled traffic-shaped network test-bed. We can emulate the same network conditions and peer behavior for testing different systems and ensure that the experiments are repeatable. These measurements highlight the differences between systems based upon their underlying implementation, overlay architecture, and choice of protocols. This measurement study helps to gauge the performance of currently available P2P video streaming systems and points out desirable performance improvements. Video streaming over the Internet is more popular with news sites and broadcasting organizations offering complete TV-programs on their websites. However, the visual quality of these streams is often not very good, especially the frame rate is not competitive with real TV [7] [4].

II. PROBLEM STATEMENT

The nature of P2P streaming is based on downloading video chunks over the overlay network from different peers across a large-scale system. Some of the participants are not close to the receiving node. So, latency is expected to affect throughput. However, according to different measurement studies over different P2P streaming applications, we found that in many frameworks the connections and re-connections to the peers are done randomly. This indicates that network-awareness is absent and also network behavior handling is difficult. So it will affect the QoS to the end-users satisfactions. So it is important to combine techniques aimed at increasing the throughput, reducing the packet loss ratio, and tolerable end to end delay. These parameters have been considered under different conditions. The main objectives are i) identify the client in the network. ii) Establishment of communication between client and server. iii) Transfer the audio video file from server to client. This work proposes one peer is a server and other is client. From the server peer we send a audio video file which is received by the client peer side and processed it frame by frame.

III. LITERATURE REVIEW

Peer-to-Peer streaming has been researched from different

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perspectives. Different studies have researched and tested different P2PTV streaming systems such as [3] [4] [5]. Peer-to-Peer (P2P) networking has recently emerged as a new paradigm to build distributed network applications. The basic design philosophy of P2P is to encourage users to act as both clients and servers, namely as peers. In aP2P network, a peer not only downloads data from the network, but also uploads the downloaded data to other users in the network. The uploading bandwidth of end users is efficiently utilized to reduce the bandwidth burdens otherwise placed on the servers.

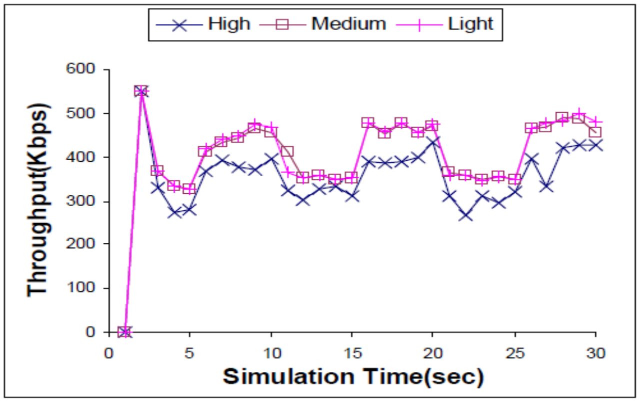

Figure 1 Throughput: Proposed algorithm

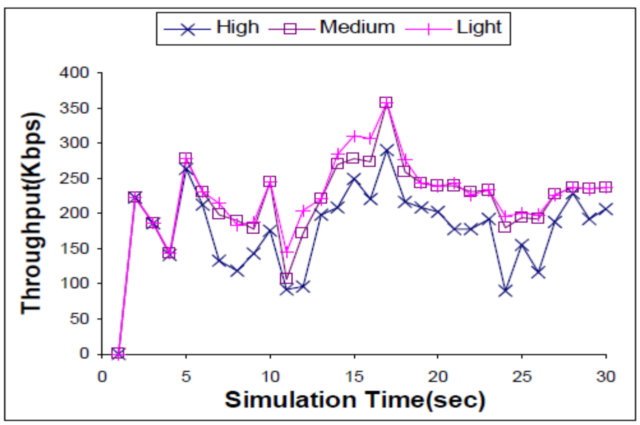

Figure 2 Throughput: Normal Scenario

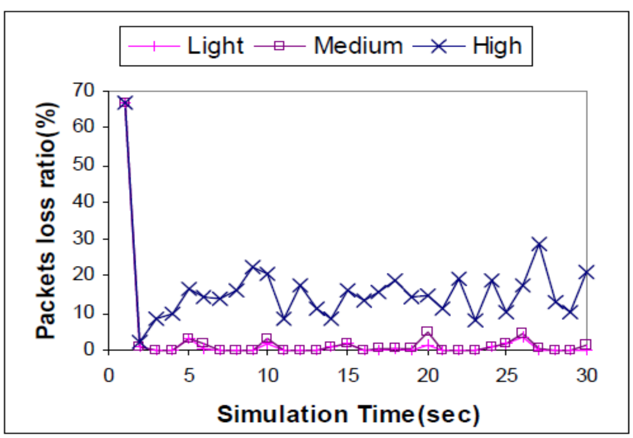

Figure 3 Packets loss ratio: Proposed algorithm

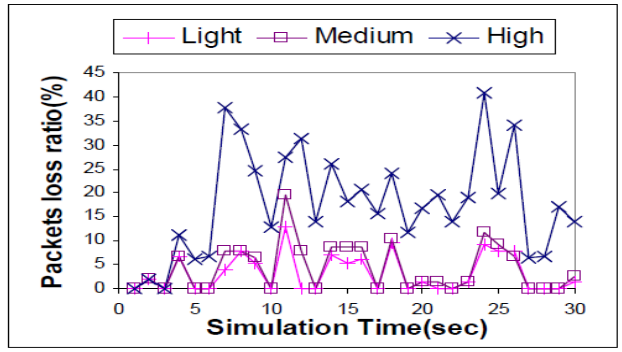

Figure 4 Packets loss ratio: Normal Scenario

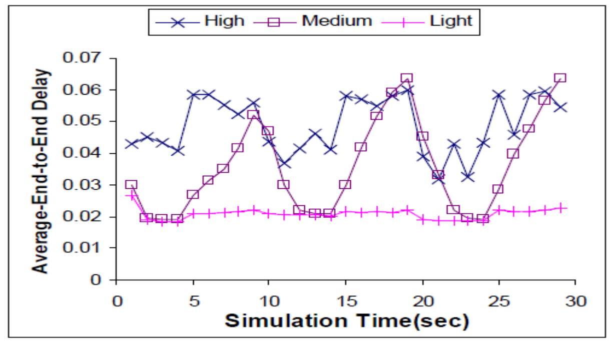

Figure 5 Average End-to-End Delay: Proposed algorithm A more generic approach, where they acquire some

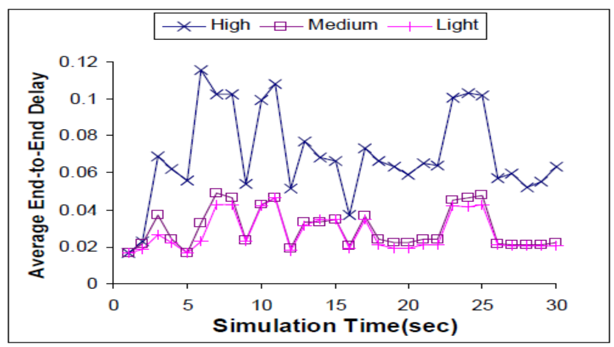

Figure 6 Average End-to-End Delay: Normal Scenario

Information (e.g. low latency, low number of hops and high bandwidth) and use them to construct the overlay network. Fault-tolerance is an important concern in the design of any streaming system, since it will have to deal with packet losses, failing links, and failing nodes [10]. To solve this problem we propose to measure the properties of the resources in real-time. P2P tracks the latencies, bandwidths, and packet losses on the links between P2P nodes. The second problem is free riding. Free riding occurs when peers do not donate resources to the P2P network [3]. This is a major threat to P2P systems. By looking at these studies, it can be found that the main aim was to select the best peers among the other peers, which is a good way of improving the QoS.

The algorithm [3] was tested on different network condition on different effective parameters (such as throughput, packet loss and end to end delay) which absolutely reflect the performance of the algorithm. The above result observed by the proposed algorithm [3]. Moreover, Figure 6

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indicates that the normal scenario in some conditions reaches up to delay of 0.1 seconds, which is not tolerable on the video extent. By contrast, as it can be noticed from Figure 5, the proposed techniques [3] have ended up with an average of 0.02, 0.03 and 0.04 seconds under the three network conditions, respectively. The above presented results show that in order to further improve the efficiency and final quality of P2P streaming systems, greater attention should be given to the actual network. Many of the existing frameworks focus on the optimization of computational resources (i.e. operate at the application layer) and fail, in this way, to make an efficient use of the network. This study has shown how network awareness (e.g. locality) has significant potential in P2P.

IV. PROPOSED MODEL

On the other hand, as most of the participants on the overlay are residential users, they will not be able to offer high bandwidth. Therefore, this will affect the quality of services parameters, as it is not guaranteed that the network conditions will not experience any congestions or link failure. Furthermore, P2P in its nature is dynamic since peers are free to join or leave frequently. This introduces another issue whereby churn of peers, link failures and intercommunication switch over among peers (or handovers) all contribute to negatively affect stream delivery. The proposed model is presented as follows,

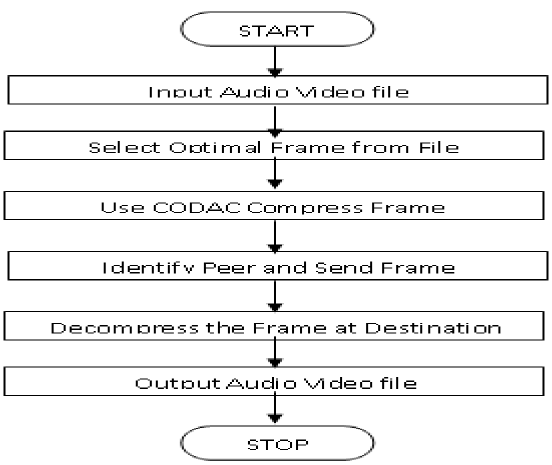

Figure 4.1 Proposed Model

In order to evaluate the proposed model on different network conditions, such as

a. Nodes are highly congested: in this scenario the network is highly traffic overcrowded.
b. Nodes are medium congested: where the network traffic is in an intermediate size.
c. Nodes are lightly congested: which shows that bandwidth is available to most of the peers.

The proposed approach will be effective on different parameters under different network conditions. These parameters are,

a) Throughput: is the average rate of successful delivery of the packets. The throughput can be measured in different ways such as bit/s or packet/s.
b) Packet loss ratio: The ratio between the dropped and transmitted data packets. This gives an account of efficiency and of the ability of the network to discover routes.
c) Average end-to-end delay: The average time span between transmission and arrival of data packets. This includes all possible delays introduced by intermediate nodes for processing and querying of data.

This proposed model will be implemented in java and jmf and tested on a normal overlay network scenario. Then we will observe results for significant improvements on QoS (i.e. Throughput, Packet loss ratio, Average end-to-end delay) under a mixture of network conditions. This proposed model will more effective on to reduce the average end to end delay that is not tolerable in real time streaming service. This proposed model will be developed for *Video-On-Demand* service.

V. FLOWCHART OF PROPOSED MODEL

In this proposed model first identify the client peer and run the server peer program and the client peer program. Then it establish a connection between the server peer and the client peer. For this purpose ,we use the Session Initiation Protocol is an Internet Engineering Task Force (IETF) standard protocol for initiating an interactive user session that involves multimedia elements such as video, voice, chat, gaming, and virtual reality. Because the SIP supports name mapping and redirection services, it makes it possible for users to initiate and receive communications and services from any location.

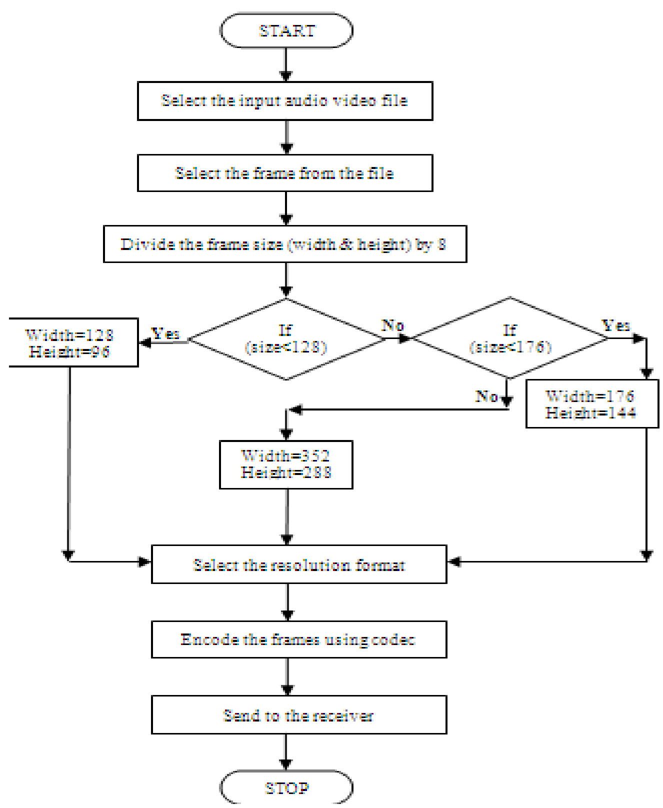

Figure 5.1 Flowchart of Server Peer model

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The proposed model is divided in to two parts. First part includes the detail work flow of the server peer program and Second parts include the detail work flow of client peer program. After establishing the connection between server peer and client peer, our first part i.e. server peer program works according to the proposed model is as follows,

At the receiver side i.e. client peer, our second part of the work, client peer program works according to the proposed model is as follows,

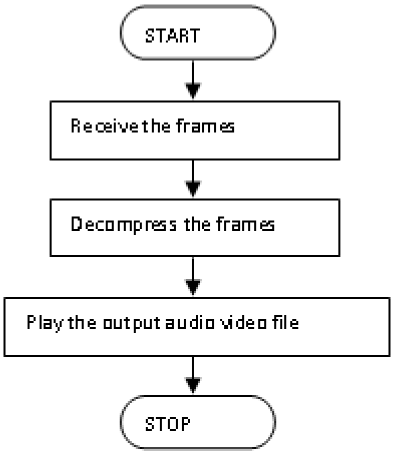

Figure 5.2 Flowchart of Client Peer model

VI. CONCLUSION

The main aim of this proposed model is to improve the QoS and smooth the quality of video delivery. One of the aims of our work is to show the possible way to improve the QoS and keep it smooth even under different circumstances of the P2P network. The key strategy was to study ways to target the quality of service, which eventually leads to quality of experience and end-users satisfactions. So it is important to combine techniques aimed at increasing the throughput, reducing the packet loss ratio, and tolerable end to end delay. These parameters will be considered under different conditions. In future works, it may be a good idea to transform the audio video and which will communicates with a camera.

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