International Journal of Engineering Inventions
e-ISSN: 2278-7461, p-ISSN: 2319-6491
Volume 4, Issue 2 (August 2014) PP: 45-49

Simulation Study of Video Streaming in Multi-Hop Network

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ABSTRACT: *The main problem is to avoid the complexity of retrieving the video content without streaming problem in multi network clients. The proposed work is to improve Collaboration among streaming contents on server resources in order to improve the network performance. Implementing network collaboration on a content delivery scenario, with a strong reduction of data transferred via servers. Audio and video files are transmitted in blocks to clients through the peer using the Network Coding Equivalent Content Distribution scheme. The objective of the system is to tolerate out-of-order arrival of blocks in the stream and is resilient to transmission losses of an arbitrary number of intermediate blocks, without affecting the verifiability of remaining blocks in the stream. To formulate the joint rate control and packet scheduling problem as an integer program where the objective is to minimize a cost function of the expected video distortion. Suggestions of cost functions are proposed in order to provide service differentiation and address fairness among users.*
Keywords: *Datagram Congestion Control Protocol (DCCP), Video Streaming, Packet Traces*

I. Introduction

In wireless networks, one way to achieve the best possible streaming quality is to leverage all available wireless spectra by connecting the streaming server to each client via multiple access networks [1]. A streaming server may transmit a Video concurrently over multiple access networks to a multi network client, thus aggregating the various wireless spectra to achieve better streaming quality. We call this setup multi network (multi homed) video streaming, which is particularly challenging because access networks are diverse and dynamic [3]. We note that concurrently activating multiple network interfaces may lead to higher energy consumption on mobile devices.

Transmitting a sub stream at a low rate may underutilize the network resources, while transmitting at a rate close to the available bit rate may lead to network congestion, which in turn causes packet drops and late packet delivery.

By providing this optimized video streaming over internet packet traces we can obtain many advantages like Downloading time can be reduced by using stochastic process, Video contents are fragmented, encoded and placed in the separate peers while uploading in the server. The content downloaded from each peer is retrieved based on the response from each peer before downloading.

II. Literature Review

Robust Rate Control for Heterogeneous Network Access in Multi-Homed Environments

We investigate a novel robust flow control framework for heterogeneous network access by devices with multi-homing capabilities [6]. Towards this end, we develop an H1-optimal Control formulation for allocating rates to devices on multiple access networks with heterogeneous time-varying characteristics [14]. H1 analysis and design allow for the coupling between different devices to be relaxed by treating the dynamics for each device as independent of the others. Thus, the distributed end-to-end rate control scheme proposed in this work relies on minimum information and achieves fair and robust rate allocation for the devices

Resource Allocation for Multi homed Scalable Video Streaming to Multiple Clients

We consider multi homed scalable video streaming, where videos are transmitted by a single server to multiple clients over heterogeneous access networks [2]. The specific problem that we address is to determine which video packets to transmit over each network, in order to minimize a cost function of the expected video distortion at the clients. We present a network model and a video model that capture the network conditions and video characteristics, respectively. We develop an integer program for deterministic packet scheduling. We propose different cost functions in order to provide service differentiation and address fairness among users. We propose several suboptimal convex problems for randomized packet scheduling [7], and study their performance and complexity [3]. We propose an algorithm that yields a good performance and is suitable for real-time applications.

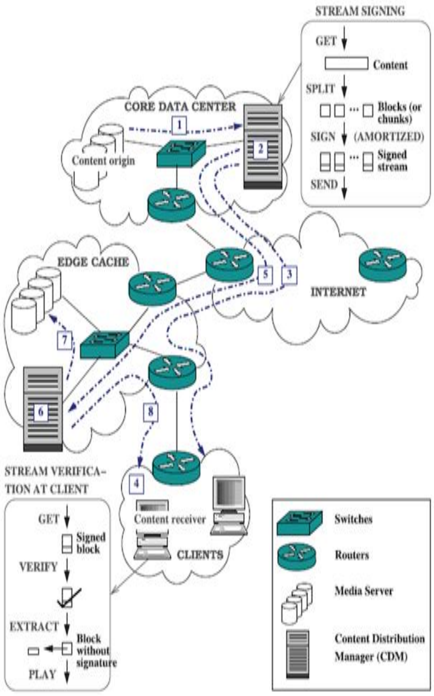
Datagram Congestion Control Protocol (DCCP)

The Datagram Congestion Control Protocol (DCCP)[1],[2] is a transport protocol that provides bidirectional unicast connections of congestion-controlled unreliable datagrams. DCCP is suitable for applications that transfer fairly large amounts of data and that can benefit from control over the trade-off between timeliness and reliability.

Broadcasting Video Streams Encoded With Arbitrary Bit Rates in Energy-Constrained Mobile TV Networks

Mobile TV broadcast networks have received significant attention from the industry and [11] academia, as they have already been deployed in several countries around the world and their expected market potential is huge [5]. In such networks, a base station broadcasts TV channels in bursts with bit rates much higher than the encoding bit rates of the videos.

III. Problem Formation



System Architecture

Fig.1 Sample system architecture for scalable video streaming

MODULES

The system contains five modules. They are,

- **SECURED AUTHENTICATION**
- **CDN CONSTRUCTION**
- **VIDEO STREAMING WITH SECURITY**
- **EFFICIENT CONTENT DISTIBUTION**
- **END USER**

Secured Authentication

The secured authentication is the first module in this application. This module is to register the new users and previously registered users can enter into our application. The content publisher in the CDN network can only can enter and do the uploading videos files into the servers. The secured authentication module verifies whether the authorized user is accessing the application or not. It gives security for the application form unauthorized users.

CDN Construction

Content Delivery Networks (CDN) has been created to reduce web content distribution performance and quality of service achievement problem. CDNs are computer networks that contain multiple copies of data, placed at different locations to maximize bandwidth usage and to achieve quality of service without packet loss [8]. By using CDNs, dependency on the publishing servers will be alleviated, providing an increase of content availability and scalability. Despite this, they are still faced with limited resources, as these resources depend on the number of servers available in the network, and might not adapt quickly enough to Slashdot effect. Thus, they are not ideal implementations and don't take advantage of users available resources

Video Streaming With Security

In this module, we have proposed several techniques for stream (or flow) authentication that aim at reducing the computation and communication overhead associated with securing individual blocks that comprise a stream. It requires time synchronization between content publisher a verifier, sufficiently large buffers of all unverified blocks (until the verification key is received), and storage of long key chains which can lead to scalability issues.

In the authentication technique, provably secure in a formal adversarial network model that limits the capabilities of an adversary to inject and delete packets by discrete quantities. The signature operation for the entire stream and adds only a constant size authentication overhead per packet, however, requires the sender to possess the entire stream before signing. The video files are uploaded in the peer availability after fragmentation. The files are encoded and stored in the CDN network for security which helps in packet [4] loss and misbehave of nodes

In this module, the proposed signature amortization technique works by authenticating the initial video stream using a signature and key is created and uploaded in the CDN network. The whole video stream is fragmented as a block and stored in the individual peers after encoded [1]. If individual peer tries to retrieve the individual block stream the content will not be displayed. After the signature verification only the stream will be defragmented and the displayed to the end users. The secret key create unique signature key are each and every stream content uploaded into the CDN Server which enhance security for the packets without any loss.

Efficient Content Distribution

In this Module, The components include a core data center, multiple edge caches each serving multiple clients, and the CDN backbone (Internet or WAN). Edge caches are strategically distributed worldwide to lower content delivery costs to requesting clients. Both core data centers and edge caches consist of a media server and a content distribution manager (CDM). The media servers provide storage of media content. The Due to the distributed nature of this architecture; the load balancing mechanism will be implemented using a dynamic DNS protocol. The DNS protocol doesn't allow a content aware load balancing, so the content must be divided in blocks that will be mapped into different Peers. To orchestrate this feature a centralized entity was created, which is called Network Controller (NC). This entity is also responsible for replica placement management, based on statistical data received from users. Each user periodically sends information about download stats, like: download speed; round trip time; download bytes and server availability.

End User Module

This layer represents anyone who is interested in downloading contents from the top layer. While downloading the contents, users may provide data to others through Protocol. Thus the data will be downloaded by the users from cdn server the user initially login the application and give the request for stream download from the server. To perform verification technique the user has to give the signature key to retrieve the original stream. If key matches then server gives request to peers for retrieving the stream data.

IV. Simulation Result

Thus we have seen about various methodologies of streaming videos from a server to client using multi hopping network in heterogeneous system. Using the rate distortion method video streaming can be done optimized way by using the internet packet traces. In this we identify the low traffic network system by sending data request to all available servers and by reply from the server we can find. Then the connection will establish between those two servers and client and video packets will be send and streamed in the client side. From this, data loss, delay and connection errors can be avoided.

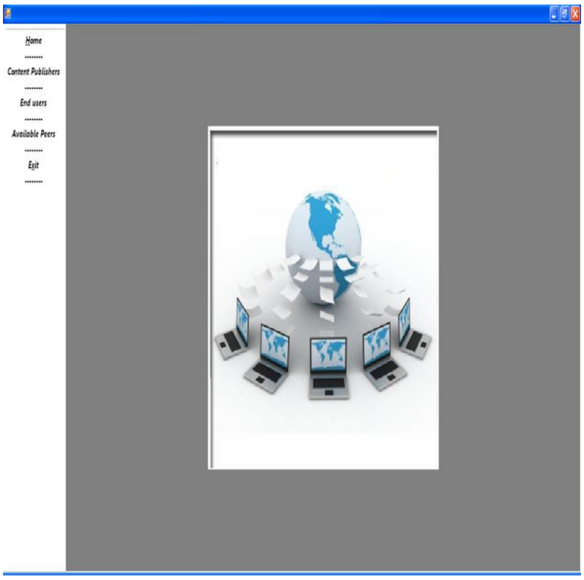


Fig.2. setup for login and connecting networks

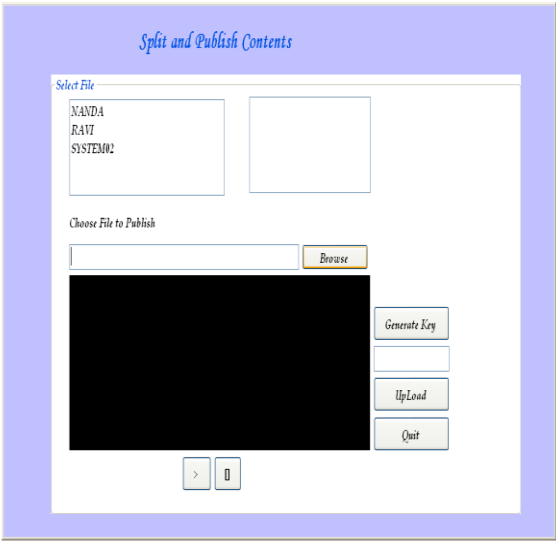


Fig.3 Splitting up videos and publishing to servers

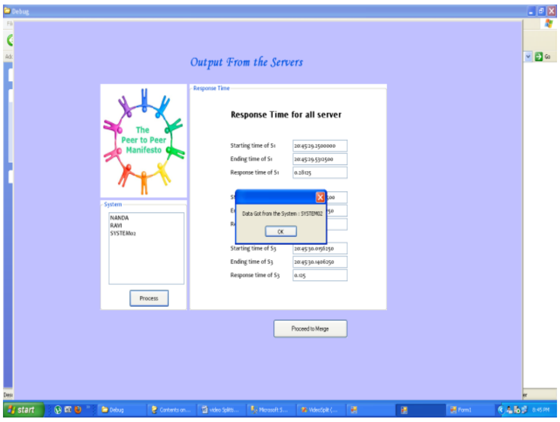


Fig.4. The data is receiving from the server to client system

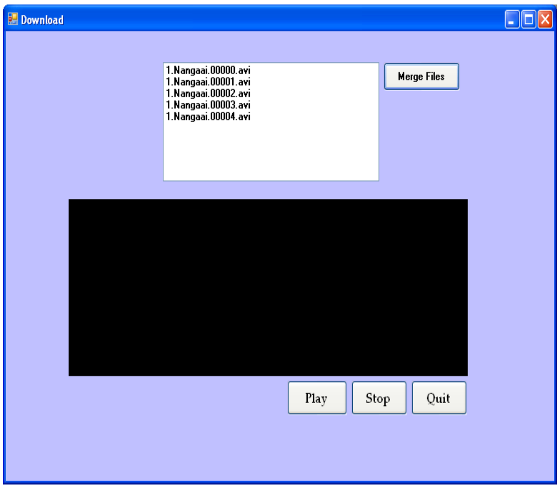


Fig.5.The data is downloaded to client system

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