An Improved Framework for Video Transmission without Distortion in Wireless Multihop Network

[1]Lavanya Chilla, [2]Dr. K Sujatha
[1]M.Tech (CSE) from Diet, Anakapalli, Visakhapatnam, [2] Professor, Diet, Anakapalli, Visakhapatnam

Abstract: Distinctive routing systems designed for wireless network are application agnostic, to overcome this we consider a wireless network where the application flows consists of video traffic. Implementation of resistant distortion in video streaming is very typical by user, Video streaming in MANETs is most Challenging issue and it mainly affected by factors like node mobility, dynamic change in topology, multi path shadowing and fading, collusion, interference and many more. The dynamic change in topology causes periodic connectivity which results in large packet loss. Video streaming in real time requires special techniques that can overcome the losses of packets. To account for the evolution of the video frame loss process, we construct an analytical framework to, first, understand and, second, assess the impact of the wireless network on video distortion. The framework allows us to formulate a routing policy for minimizing distortion, based on which we design a protocol for routing video traffic. Here in this paper we have studied and reviewed many issues and different techniques present for video streaming over MANETs. This paper contain work done in the field of video streaming in MANETs and guide newcomers who are willing to work in video streaming in MANETs.

***Index Terms* – Wireless network, Protocol, Distortion, Routing, Analytical Framework, video distortion minimization, MDC, Multipath routing**

1. INTRODUCTION

In smart phones Era, video traffic has become an extremely popular in wireless networks. per user perspective, maintaining a good quality of the transferred video is crucial. The video quality is affected by: 1) the distortion because of impression at the source, and 2) the distortion because of each wireless channel induced errors and interference. Video cryptography standards, like MPEG-4 or H.264/AVC, define groups of I-, P-, and B-type frames that give totally different levels of encoding and, thus, protection against transmission losses. The various levels of cryptography refer to: 1) either data encoded independently, in the case of I-frames, or 2) cryptography relative to the information encoded inside other frames, as is the case for P- and B-frames combining together they form a group of pictures (GOP). Critical functionalities that's usually neglected, however affects the end-to-end quality of a video flow, is routing ancient routing protocols, designed for wireless multihop settings, are application agnostic. Video quality can be improved by accounting for application requirements. The schemes used to encode a video clip can accommodate a certain number of packet losses per frame. If the number of lost packets exceeds a threshold value then the frame cannot be decoded correctly. Thus, resulting a distortion. The value of distortion depends on position of unrecoverable video frames in the GOP (Group of Pictures). So, we construct an analytical model to view the behavior of the process that describes the evolution of frame losses in the GOP. Using this we capture how the choice of path for an end-to-end flow affect the performance of a flow in terms of video distortion. Ad-Hoc networks are categorized into two types of routing protocols, i.e. Table-driven routing protocols and On-demand routing protocols. Table-driven routing protocols are also known as pro-active routing protocols. These protocols attempt to maintain an updated routing table with routes to all known destination nodes in the network. This has the advantage of minimizing the delay during routes lookup and the disadvantage of these protocols is that it consumes a lot of network bandwidth. Whereas On-demand routing protocols only update the routing table in response to a routing request. This has the advantage of minimizing network traffic overhead and disadvantage of these protocols is increased delay. Our model is built based on a multilayer on approach as shown in fig1.The packet-loss probability on a link is mapped to the probability of a frame loss in the GOP and the frame loss probability is then directly associated with the video distortion.

Using the above mapping from the network-specific property to the application-specific quality metric, we indicate the problem of routing as an optimization problem where we can find the path from the source to the destination that can minimizes the end-to-end distortion.

The solution for this problem is based on a dynamic programming approach that effectively captures the evolution of the frame–loss. After this we design a practical routing protocol, based on the above solution, to minimize routing distortion. The overall challenge is to provide the consumer with a satisfactory perceptional quality, i.e., quality of experience (QoE), sustainable throughout a multimedia session. This means providing sufficient bandwidth in the network, while preserving an upper bound on delay and jitter. It should be noted that constraints on acceptable end-to-end delay is much stricter for streaming of live or conversational content (e.g., television broadcasting, voice over IP and video conferencing), as opposed to streaming of stored content. These challenges have been addressed for video transmission over wired networks for many years. When moving streaming video onto wireless networks, wireless links have far stricter bandwidth limitations.

2. RELATED WORK

The encoding and transmission of video indicates the significance of video communication. Different approaches exist in handling such an encoding and transmission. Multiple description coding is a coding technique that fragments a single media stream into n sub streams referred to a description. The packets of each description are routed over multiple (partially), disjoint paths. In order to decode the media stream any description can be used. The idea of MDC is to provide error resilience to media stream. Standards just like the MPEG-4 and also the H.264/AVC give tips on how a video clip should be encoded for a transmission over a communication system supported layered cryptography. H.264/AVC is newest video cryptography commonplace of the ITU-T Video cryptography experts group and the ISO/IEC picture consultants group. The main goals of the H.264/AVC standardization effort have been increased compression Performance. -- H.264/AVC has achieved a significant improvement in rate distortion efficiency relative to existing standards. This article provides a summary of the technical features of H.264/AVC, describes profiles and applications for the quality, and descriptions the history of the standardization method. In it presents the expected transmission count metric (ETX), that finds high-throughput paths on multi-hop wireless networks. The ETX metric incorporates the consequences of link loss ratios, asymmetry within the loss ratios between the 2 directions of every link, and interference among the successive links of a path. In distinction, the minimum hop-count metric chooses at random among the different paths of a similar minimum length, regardless of the usually massive variations in throughput among those paths, and ignoring the possibility that an extended path might offer higher through put. In an analytical framework is developed to model the effects of wireless channel fading on video distortion. We propose an accurate and fully analytical model for the distortion due to lost packet in wireless communication system. The model is, however, only valid for single-hop communication. In MDC is considered for video multicast in wireless ad hoc networks. Although these 2 papers think about the distortion since they're using MDC technique. Our approach differs not only on the way we model video distortion, however additionally on the actual fact that we tend to target LC, which is a lot of popular in applications nowadays. The Multiple Description cryptography technique fragments the initial video clip into a number of sub-streams known as descriptions. The descriptions are transmitted on the network over disjoint paths. Even one description received at the receiver entire video is decoded however only if all the n received quality is nice. Layered coding produces a base layer and multiple enhancement layers. The improvement layers serve only to refine the base-layer quality and aren't useful on their own. Layered coding is employed because of its popularity in applications and adoption in standards. The work in proposes a theme for energy-efficient video communications with minimum QoS degradation for LC. The routing scheme is predicated on a hierarchical model. To support such a hierarchy, the nodes need to be grouped in clusters, and a method of electing a cluster head needs to be executed periodically, increasing the process and data communication load of the network. In our projected theme we have a tendency to assume a flat model where all nodes within the network are equivalent and perform a similar set of tasks.

3. IMPLEMENTATION

This model is application agnostic this provides the packet loss probability due to traffic and interference in the network. Our analytical model couples the functionality of the physical and mac layers of network with the application layer for a video that is sent from a source to a destination node. The model for the lower layers evaluates the packet loss probability through a collection of equations that characterize multiuser interference, physical path conditions, and traffic rates between source– destination pairs within the network. This packet-loss probability is then input to a model 2 to compute the frame-loss probability and from that the related distortion. The value of the distortion at a hop on the path from the source to the destination node depends on the position of the first unrecoverable frame in the GOP.

3.1 Video Distortion Model

Since we are using the multi-hop we, develop a analysis model where it captures the evaluation of the distortion at different links from source to destination. By considering a GOP structure which consists of an I-frame followed by P-frames. So the index each frame in the GOP starting from 0, i.e., the I-frame corresponds to index 0, and the P-frames correspond to indices from 1 up to. We focus on predictive source coding where, if the ith frame is the first lost frame in a GOP, then the ith frame and all its successors in the GOP are replaced by the (i-1) st frame at the destination node. Our analysis is predicated on the model for video transmission distortion. The distortion is divided into source distortion and wireless transmission distortion over one hop. Instead of focusing on one hop, we tend to significantly extend the analysis for multihop by developing a model that captures the evolution of the transmission distortion on the links of a route from the source node to the destination node. Assuming that the packet losses in different frames within the GOP are independent events (likely if the fading patterns modification in between), the transition probabilities for the method, can be computed.

3.2. Video Distortion Dynamics

The value or number of the distortion at hop on the path from the source to the destination node depends on the position of the primary unrecoverable frame in the GOP. The value zero indicates that the first (I-frame) is lost, and so the full GOP is unrecoverable. A value larger than zero denotes that the corresponding P -frame is that the initial frame in the GOP that can't be decoded correctly and the value indicates that no frame has been lost therefore, yielding a distortion.

3.3. Optimum Routing Policy

In this module, our objective is to search out the path that yields the less video transmission distortion between any source and destination. By using the analysis given, we tend to pose the problem as a random optimum management problem where the control is that the choice of future node to be visited at every intermediate node from the source to the destination. We tend to decide that this optimization problem is called as Minimum Distortion Routing (MDR) Problem. MDR problem has the following characteristics:

L 1: MDR satisfies the overlapping property, i.e.,

The problem is divided into smaller problems that retain a similar structure.

L 2: MDR satisfies the optimum substructure property, i.e., the sub-path of an optimum path is optimal for the Corresponding sub-problem

4. PROTOCOL DESIGN

The solution to the MDR problem can be computed by using the source node. The source node will sample the network to gather the information about the state of the network during the path discovery process using which the ETX can be computed which measures the quality of the network. After this estimation the "Route Request" message is passed during the Route Discovery phase. After receiving the "Route Request" message the Algorithm 1 steps are followed, which defines the initial state as x-(s, F), where F is the GOP size. The boundary size is defined as B, which represents the terminating set for the optimization process. To calculate the answer to the MDR problem, data of the entire network is necessary. The answer to the MDR problem will be computed by the source node supported partial information relating to the worldwide state that it gathers. The source node should sample the network during a path discovery method so as to gather information relating to the state of the network. The sampling method includes the estimation of the ETX metric for every wireless link within the network. These estimates give a live of the quality of the links. The estimation method is implemented by tracking the successful broadcasting of problem messages in periodic time intervals. Input: source node s, destination node d.

Algorithm 1:

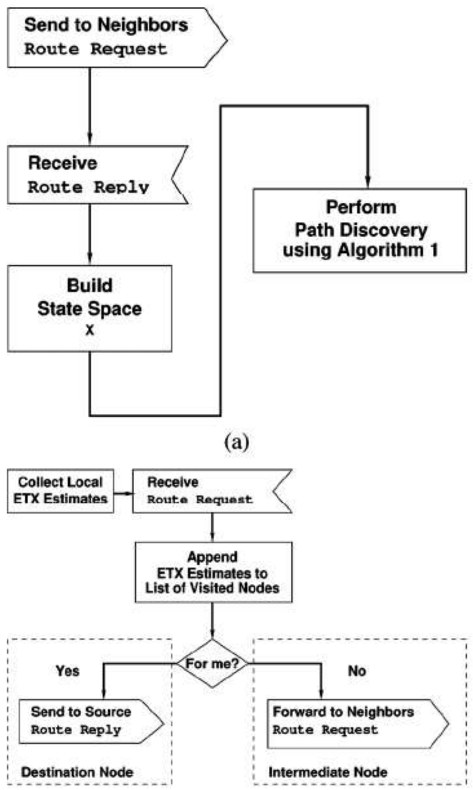
```
Input: Frame size F.
Output: route R from s to d.
/* Route discovery */
send Route Request
receive Route Replay (ni,ETXi) message
N= {node-ids ni from Route Reply messages}

/* path discovery */
n<- S
c<- F
B= {(d, c) | 0<=C<=F}
R<- [ ]
x<- (n, c)
append x to R
/* Path computation /*
repeat
u* <- next_node_in_optimal path(x,B,N)
c^ <- E[Cnew | Ccur=c]
n<- u*
c <-c^
x <- (n, c)
append x to R
N<- N-{u*}
until xϵ B
```

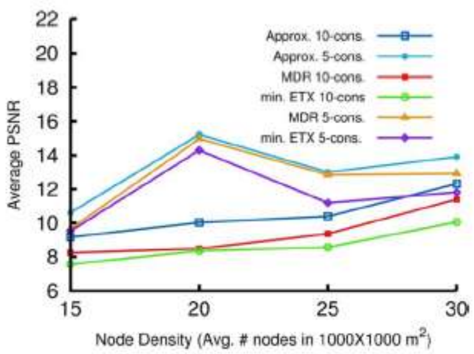
Algorithm 2

```
Next Node in optimal path
Input: Initial state xs, boundary set B
Input: set of available nodes N
Output: net node n* in the optimal path
/* Initialization */ C= {0, 1,----F}
L=N*C
T <- ||L||
/* optimal control computation */
for i=T to 1 do
if i=T then
for all xϵH do
Ji(x) <- K(x)
end for
else
for all x= (n, c) ϵ H do
U (n) <- {n` | n, n`1-hop neighbors}
ji(x, u) <- {g(x, u) + sum of x` Pi (c, c` | 0) Ji+1 (x`)}
Ji(x) <- minuϵU(n) ji(x, u)
Pi(x) <- arg min uϵU (n) ji(x, u)
end for
end if
end for
n* <- p, (xs)
return n*
```

5. RESULTS

We represent the performance gains of the proposed routing theme via extensive simulations and test be experiments. We tend to use the network simulator ns-2. That provides a full protocol stack for a wireless multi-hop network. We tend to extend the functionality of ns-2 by implementing our projected routing theme on top of the present protocol stack. For the test bed experiments, we tend to implement our scheme using the click modular router. We implement 2 totally different strategies and experiment with each, one after another. The first technique estimates the ETX value for every link between a node and its neighbors for all the nodes within the network. The mechanism broadcasts eriodically (every one s) little probe messages of size 32bytes and checks for acknowledgments from the neighbours of the node. The routing policy computes the To evaluate the performance of the MDR protocol, we tend to compare it against the minimum ETX routing theme. The pair of nodes that represent the source and destination in every case are selected at random. If they happen to be neighbors, we discard that pair and repeat the method till we tend to select a source and destination that are over one hop apart. Every set of experiments is repeated 10 times, and therefore the average value is reported in every case. Our simulation experiments specialize in 3 metrics: 1) the PSNR, that is an. objective quality measure; 2) the MOS, that is a subjective quality metric; and 3) the Delay experienced by every video connection. The PSNR (Peak signal/noise Ratio) is that the most widespread objective metric to measure the digital video quality, it doesn't always capture user experience. Minimum ETX path from the source to a destination and uses that path to transfer the video packets. The second technique implements the protocol defined in implementation so as to compute the routes on the wireless network that achieve minimum video distortion. We tend to use EvalVid which consists of a collection of tools for the analysis of the quality of video that's transmitted over a true or simulated network. The toolset supports totally different performance metrics like the PSNR and also the MOS.





Average PSNR for 5 and 10 video connections (Set-I).

TABLE I
VIDEO ENCODING PARAMETERS

	Set-I	Set-II	Set-III
GOP Size	5	10	10
Frames per second	30	30	15
Rate	273 kbps	273 kbps	136 kbps
Frame Size	QCIF (176x144)		
MTU	1024 bytes		

6. CONCLUSION AND FUTURE WORK

Video Streaming is recently very important research area in the MANETS. In This paper we provides a classification and specification of the issues involved in video streaming over MANETs and the techniques proposed to tackle them. The routing policy is application-aware that provides benefits in terms of user-perceived performance. Specifically, we consider a network that primarily carries video flows. The impact of routing will be on end-to-end distortion of video flows. For this, we construct an analytical model that ties video distortion to the underlying packet-loss probabilities. Using this model, we find the optimal route (in terms of distortion) between a source and a destination node using a dynamic programming approach We seeing as most solutions are based on cross-layer design, we give an overview and analysis of the combinations of layers and the exchanged parameters that are generally used. This survey is shows that general, currently existing techniques begin dynamicity and stringent resource constraints by mutually optimizing transmission parameters at various layers of the protocol stack. Stringent constraint in resources, high amount of dynamicity and frequently occurring transmission and path errors make MANETs a challenging environment over to realize video streaming. the optimum route (in terms of distortion) is decided between a source and a destination node based on dynamic programming approach. The framework permits to formulate a routing policy for minimizing distortion, based on that we tend to design a practical routing theme that's evaluated via extensive simulations and testbed experiments. Our simulation study Congestion is no longer handled entirely at the transport layer, primarily because rate adaptation should be handled by a flexible video codec. Our survey concludes few papers include enough information for the experiments to be repeatable. Experimental results are often difficult or impossible to compare, due to the high variability of experiment parameter values. There are still certain problems, which are up till now properly addressed. In MANETs, however, the probability of the existence of such a path may be low at any given point in time. Furthermore, mobility can cause this connectivity to disappear and appear frequently and unpredictably. More research is required to provide delay-tolerant streaming solutions for MANETs incorporating the above-mentioned mechanisms. In general, realizing video streaming over MANETs, there already exist many different types of techniques to handle video streaming issues in MANETs. Until now, there are many unsolved issue are addressed in future research.

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