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Analysis of Channel Error Rate at Various Segment Sizes for MPEG-4 Traffic in NS-2

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Abstract : The networks are increasingly becoming more demanding and sophisticated in terms of network parameters. With the increase of bandwidth of the channels, it becomes necessary to take care of other network parameters like Maximum Transmission Unit (MTU)[8], Delay, Reliability, Jitter etc. One of the major impacts of increase of Bandwidth in the networks; may it be infrastructure wireless networks, optical networks are Mobile Adhoc Networks is on the Maximum Transmission Unit(MTU). Enhanced bandwidth demands a higher MTU and thus evaluation of the fragmentation or fragment size on the transmission of data becomes imperative. In this paper, we have evaluated the effect of fragmentation on the MPEG-4[2] traffic in Adhoc Networks.

Keywords: MANETs, Evalvid, MPEG-4, Fragmentation, AODV[1]

I. Introduction

Mobile Ad-hoc Networks are typical examples of infrastructure-less networks and are established on the go. A lot of work on the improvement of routing of data in MANETs [6] for different classes has been done; latest being the multimedia traffic class. With more and more content on the network becoming audio-visual, it essentially becomes important to study the analysis of multimedia in Mobile Adhoc Networks.

This paper discusses the implementation of fragmentation on the multimedia traffic class, i.e. MPEG-4 in Mobile Adhoc Networks. The NS-2 is the most popular simulator for the simulation of Mobile Adhoc Networks. In order to evaluate multimedia traffic in NS-2[7], a framework EVALVID[3] is integrated to NS-2. Evalvid is a tool-set which is usually evaluating the quality of video. Thiss framework measures the various QOS[8] parameters like packet loss, delay etc. It also predicts the evaluation of video quality which is received at the receiver side based on the calculation of PSNR [1].

II. MPEG-4

MPEG-4 (Motion Pictures Expert Group-4) [5] standard was introduced in late 1998. This standard enables the compression of audio-visual data at better quality. This standard supports specific functions in the form of efficiency, interactivity etc. [2].

III. Methodology

The simulator environment is based on Cygwin installed on Windows-XP operating system. The simulation consists of two nodes node -1 and node -2 which are exchanging a multimedia file (i.e. MPEG File). Node -1 is source and node-2 is sink. The traffic is routed using AODV Protocol [1]. The total size of the MPEG file is sent approximately 50Mb. The simulation setup is designed to analyze the performance metric-"fraction of decodable frames".

The data transfer takes place from node-1(source) to node-2(sink) in packets. The number of packets depends upon the frame size. If the frame size is small the number of packets is large i.e. fragmentation is more, if the frame size is large the number of packets will be small i.e. the fragmentation is less. The analysis reveals that upon increasing the number of frame size for constant channel error rate the fraction of decodable frames will be increases. We have tested the MPEG-4 Traffic for the following "maximum frame sizes" parameter:

i. 256 bytes
ii. 512 bytes
iii. 1024 bytes

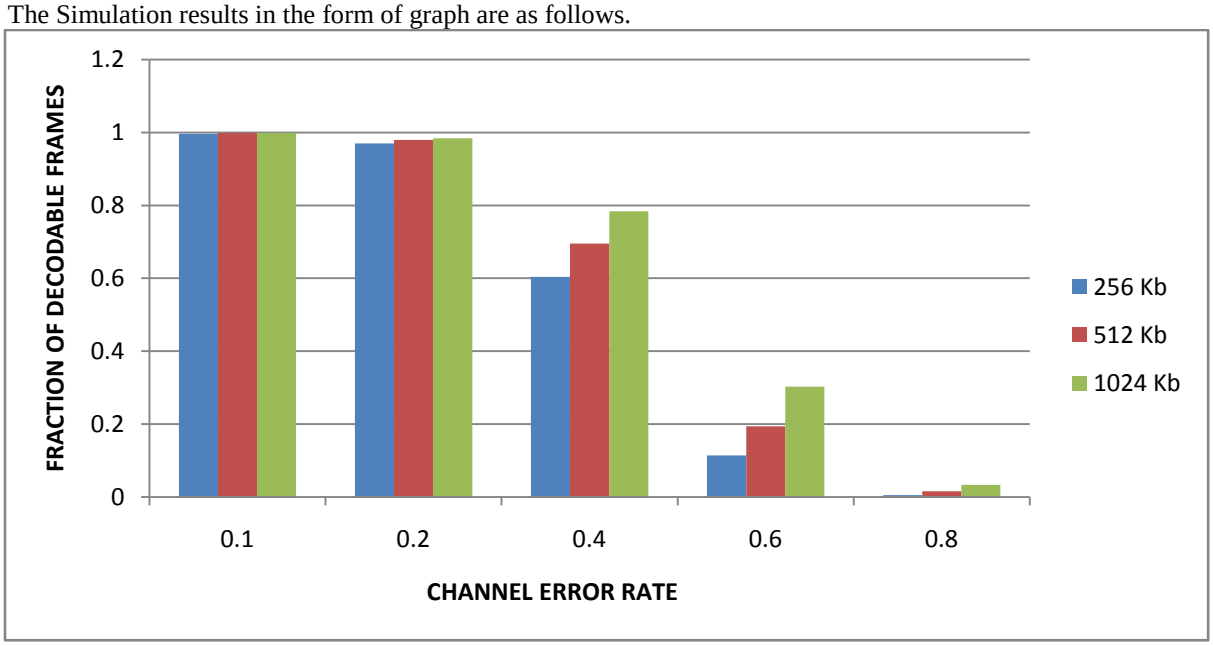
Under the following channel error rate 0.1,0.2,0.4,0.6,0.8

The Simulation results show fragment size does not deteriorate the "fraction of decodable frame received when the channel error rate is 0.1; but as the channel error rate increases the fraction of decodable frame received decreases with the decrease in the fragment size. The result is more significant at channel error rate equal to 0.4, 0.6 and 0.8.

The exact simulation results are presented in a tabular form below.

Fragment Size\Channel Error Rate	0.1	0.2	0.4	0.6	0.8
256 Kb	0.996544	0.970144	0.603791	0.113825	0.0056
512 Kb	0.998722	0.979988	0.695071	0.194104	0.0155
1024 Kb	0.998744	0.983722	0.783729	0.302729	0.033123

The Simulation results in the form of graph are as follows.



IV. Conclusion and Future Scope

The objective of the work is to understand and analyze the effect of fragmentation on the multimedia traffic over UDP. The The Simulation results show fragment size does not deteriorate the "fraction of decodable frame received when the channel error rate is low; but as the channel error rate increases the fraction of decodable frame received decreases with the decrease in the fragment size. The study can be extended with the TCP traffic also under various routing protocols.

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