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Adaptive Video Streaming Through Server Driven Rate Control In Manets

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Abstract: ***The IEEE 802.11standard is developed and gained unprecedented popularity for its simple and cost-effective wireless technology to provide best effort services. But, it has to address serious challenges concerned to multimedia services. Quality of Service (QOS) is one of the most prominent among them. The tradeoff between the video quality and the streaming performance is eliminated by the quality driven rate controller's. They treat all the users alike but, where in practical it cannot be. The educational videos must be of more video quality than that of the video news, where video streaming must be more. To address the problem the proposedEquity Enhanced Distributed Channel Access (EEDCA) prioritizes the traffic according to their type and also focus on providing the Quality of Service (QOS) of a Mobile Adhoc Network (MANET) to equally distribute the resources among all the nodes to gratify the users.***

Keywords: Manet, resources, video quality, streaming performance, priorities.

1. INTRODUCTION

The evolving technology made the computing devices smarter, smaller in terms of their physical dimensions and faster in terms of their performance. In order to satisfy the user needs and their comforts the technology moved forward from a huge first generation computers to the present handheld computing devices which are much faster in terms of their computing services. Now a day'sthese handheld devices created a special position or often a necessary element of today's mankind. With their presence the live hood changed dramatically smarter (work made easier and faster). These devices have become very portable in such a way that a user can carry it alive anywhere. Having these features made these devices ubiquitous. A group of such devices which are logically connected to each other works even better than an individual. So in order to maintain these connections among them, the internet has become one of the medium. In order to accompaniment for these devices computer networks are also getting evolved from wired networks to wireless networks. Among them the Mobile Adhoc Network (MANET) is a variant of the wireless network where it arouse and employed for passing of small plain text messages at the time of emergency situations, where the existing fixed infrastructure was completely destroyed by either natural calamities or by the military based services for their remote secret services.Mobile Adhoc Network (MANET) is the special type of wireless network which is created without any pre-existing installed infrastructure. As the new techniques and protocols are being emerging these networks become more ubiquitous in today's world. The capability of these type of networks are significantly increasing day to day. Now it has potential to support for non delay sensitive data like multimedia.

There are many factors (like bandwidth, node failure... etc) which makes working of the Mobile Adhoc Network (MANET) worse. Video Streaming is the special type of technique where video data packets are delivered continuously without any interruptions. If at all any packet got dropped then the user experiences poor Quality of Experience (QoE). So video streaming is one of the most important challenge that the Mobile Adhoc Network (MANET) has to address. Traditionally in Internet Protocol (IP) Streaming is carried out in a fixed bandwidth, which will be worse for the today's wireless networks like MANET. To compensate to this issue Adaptive Video Streaming is evolved where the video source is encoded into number of multiple bit rate versions which are selected dynamically depending on the current network conditions (like bandwidth).

2. LITERATURE SURVEY

Video quality and Streaming performance are two important performance metrics of the video streaming. Video quality is determined by the choice of encoding parameters like resolution, frame rate and primarily the encoding bit rate. Streaming performance is described as how the users experience the playback. Startup delay and rebuffering are the two important factors which affect the streaming performance. So, selecting the lower bit rate will leads in reduction of the video quality and consequently increases in terms of the user's buffer capacity i.e. streaming performance is increased. It is vice versa when the selected bit rate is higher.

In order to maintain the better balance between the video quality and streaming performance, [1] proposed a new quality driven rate controller by placing a threshold, which doesn't allow the users buffer to grow dramatically at selected lower bit rate.

Now a days the video streaming is carried out through HTTP/TCP example like YouTube, where traditionally made through RTSP/RTP over UDP. Delivery through HTTP/TCP is not as much as easy to say, but it has to address a challenge - bandwidth idle. That means in HTTP/TCP delivery protocol for each individual packet to transfer a request is made by the client and after processing the request the server starts sending the packet which is requested resulting a gap in bandwidth. There is no complete bandwidth utilization. [1] address's this issue by proposing a new predictive transmission technique, where the request for the next packet is sent during the

transmission of the previous one. As the result the server doesn't wait for the request after the transmission of the current packet and sends the requested packet within no time. [2] also comes up with a solution for this request – response gap through a pipelined HTTP [3].

Quality of service (QoS) is also one of the important challenge which is to be addressed by the MANET. [4] describes the standard IEEE 802.11e which is the original standard for QoS in Mobile Adhoc Network (MANET) called the Enhanced Distributed Channel Access (EDCA) which is the enhancement of Distributed Coordinated Function (DCF) which is the fundamental MAC technique of the IEEE 802.11 based WLAN standard.DCF requires a station wishing to transmit to listen for the channel status for a DIFS interval.

3. EQUITY EDCA

Enhanced Distributed Channel Access (EDCA) is an improvement over the distributed DCF, which is used for accessing of the channel by the mobile node. The standard 802.11 MAC doesn't support for real time applications, where it is fulfilled by 802.11e standard EDCA.

EDCA introduces the prioritization of the packets in to four categories namely voice, video, best effort and background. Voice, video are having the higher priority than the remaining. Each type of the traffic has its own transmit opportunity. So, the higher priority more the transmission time which is suitable for real-time applications.

The major drawback of the technique proposed by [1] is that it will treat all the users alike i.e. all videos are considered same. But in practical it is not suited because different users are having their own priorities. For example educational videos must have more quality than that of the video news. EDCA can address this limitation but there is in-equality in resource (bandwidth) allocation among nodes. The proposed technique E-EDCA differentiates the nodes of the network into two, namely the routed and non-routed nodes. Routing nodes will routes the packets of others where the non-routing nodes will not forward packets of others. Traffic (packets) in routing nodes is classified into owned (O) and Routed (R).But the bandwidth is not equally distributed among the nodes. Routingnode has to access the channel more frequently than the other non-routing nodes.The ratios of owned packets and the routed packets are calculated to find out the new value for the contention window such that to access the channel more frequently.

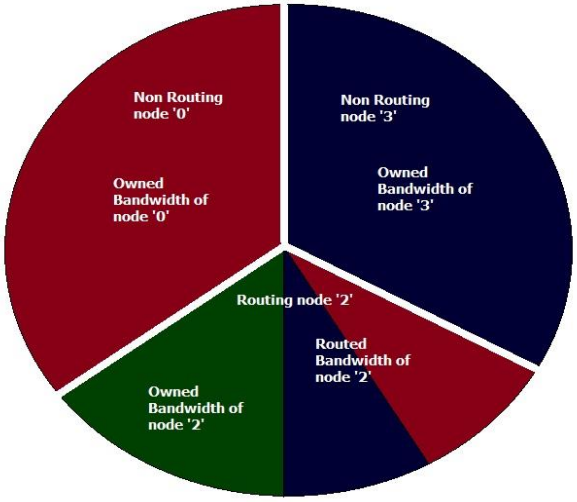

Figure 1: Unbalance bandwidth among nodes.

The ratio of owned packets at a node is calculated as follows:

$$\boldsymbol{\rho(t) = N_O(t)/(N_O(t) + N_R(t))} \qquad (1)$$

Where **ρ** is ratio, $N_{o,}$ $N_R$is number of owned and routed packets at time (t).

Depending on the value of '**ρ**' the node in the network, whether it may be a non-routing node or a routing node decides how frequently to access the channel in order to forward or to transmit the packets to the other node in a network.

E-EDCA Algorithm:

Step [1]: Differentiate between Owned (O) and Routed (R) packets.

Step [2]: Each packet is classified and queued based on its priority.

Step [3]: Compute the value **ρ** to obtain new contention window to access channel.

Step [4]: **For** Each packet at head queue **do**

Step [5]: **IF** channel is burst free then transmit the packets.

Step [6]: Else wait until the back off + AIFS Counter become 0 (zero).

4. SIMULATION SETUP

The proposed technique E-EDCA is simulated by using NS2.The simulation parameters are as follows:

Table 1: NS2 simulation parameters

Parameter	Value
NS Version	NS 2.31
Simulation time	250 sec
X dimension	1500
Y dimension	1500
Channel	Wireless channel
No of Nodes	6
Routing Nodes	{2}
Non-Routing Nodes	{0,3}
PHY/MAC protocols	802.11e
Routing Protocol	AODV
Data Type	CBR

5. RESULT ANALYSIS

The figure below shows the XgraphThroughput without EEDCA vs. with EEDCAof a routing node, which is generated on executing through NS2. The graph shows that the throughput is significantly more by employing the EEDCA than that of not having the EEDCA.

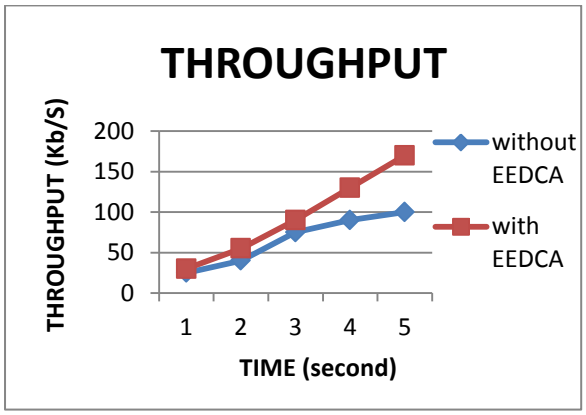

Figure 2: Throughput without EEDCA vs. with EEDCA

6. CONCLUSION AND FUTURE WORK

To gratify the users who are having their own priorities the proposed technique EEDCA solves it by considering the priorities of the traffic. A new value for contention window is calculated in such a way that the routing node (which transmits its own packets as well as the others) access the channel more frequently than the others non routing nodes. The proposed technique on executing has shown the better results in terms of the throughput. Here in this paper we focused on the QOS in terms of resource (bandwidth) allocation. In future we can even consider other factors which affect the QOS in Mobile Adhoc Network (MANET).

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