International Journal of Innovative Technology and Exploring Engineering (IJITEE)
ISSN: 2278-3075 (Online), Volume-8 Issue-12, October 2019

Collective Scheme of Transmission of Video Packet to Develop Cross Layer to Support QOS for Manet

Asha, Mahadevan.G

Abstract*: MANETs have become very predominant when it comes to wireless communications. Multimedia streaming is rapidly increasing over all social networks. In this part of multimedia communication, Mobile – Ad – Hoc network (MANET) has established its importance to deliver enhanced Quality of Service (QoS). However, it can be stated that when it comes to multimedia applications, MANETs still need some improvisation especially when it comes to video transmissions. There still exists few difficulties when it comes to MANETs that are such as limited physical security and resources, less detection of malicious nodes, lack of authorization facilities etc. To avoid all these and to improvise the network use of a new design approach known as cross-layer approach is being used extensively by various researchers.. The cross layer approach is used to efficiently make use of all the network resources in a communication channel and provide the best adaptability. In this paper, we have proposed a model that will avoid packet loss and will rebuild the video packets at the receiver end thereby improving the overall performance of the network.

Keywords: QoS, MANET, Wireless Networks, Ad Hoc Network, Transmission

I. INTRODUCTION

Wireless Ad Hoc networks comprises of many mobile nodes distributed by an autonomous system by forming an interconnection between the wireless channels. The responsibility of each node is to determine and sustain the routing functions over other nodes. This entire system can function individually or by connecting with other network gateways. Ad Hoc Wireless network can build up communication between mobile nodes anytime and anywhere without any infrastructure support or the computer host. Here nodes can behave like routers and also like hosts. This ad hoc network can have high interoperability, more flexibility, better mobility, more economical, robust network in nature etc., in comparison with other centralized network structure. Nodes in the ad hoc network are portable in nature. Almost all the ad hoc networks utilize the frequencies for ISM band.

Revised Manuscript Received on October 30, 2019.
***** Correspondence Author
Asha*, Research Scholar, Department of Computer Science and Engineering, PRIST Deemed to be University, Thanjavur, Tamil Nadu, India. Email: asha.cse.ait@gmail.com
Mahadevan.G, Principal, Annai College of Engineering, Kumbakonam, Tamil Nadu, India. Email: g_mahadevan@yahoo.com

We need a packet transmission that should ensure quality as well without any loss or delay. That's where we need QoS (Quality of Service). QoS metrics could be well-defined in terms of set of parameters. It can also be categorized by service requirements such as bandwidth, delay variance, packet loss etc. If we have the QoS support, the network can give guarantee for the packet transportation without any video frame disturbances. Due to resource limitations, real time traffic support we need QoS support in MANET as well. We need QoS support for hard real time and soft real time applications.

A well-known design known as the cross-layer design is effectively used to make use of the available resources in the network more effectively. Each layer in the network is differentiated and characterized by some specific parameters and control knobs. These parameters are then transferred to other layers so that theory could determine the best rules for adaption when it comes to the current status of the network. This design is most commonly used in wireless communication as it provides less search space and also the protocol is designed by considering the wireless networks in mind. In our proposed model we examine the parameters that affect the network's performance by identifying all the errors, delays etc. Bandwidth allocation methodology is also presented with cross layer design approach.

II. RELATED WORK

There are many proposed mechanisms regarding Ad Hoc networks and QoS support in MANET. Various methodologies have been used to improve the network performance with QoS. Some of the related works we have referred are mentioned here. Asha[1], suggested a collective scheme to upturn the performance of the network. She has used three techniques such as threshold data transmission – here to compute the threshold and with the help of it channel is selected through which video packet has to be transmitted, queuing modeling – to decrease the communication delay in ad hoc network and channel modeling – delivers the data about path loss of the channel, density function of the channel and gain parameter. Thus the proposed model is able to achieve improved and effective network communication. In [2], they employ a theoretical framework to model the D2D spectrum based on the relying scheme. Thus channel quality of the D2D links is continuous and discrete and the result confirms the efficiency of the proposed spectrum mechanism.

In [3], they propose and estimate new resolution for QAR performance improvement by proactively maintaining the backup routes for active sessions, adapting transmission rates and routing between low-SINR links. In [4], they have used real H.264/AVC video traces to simulate video sources to measure QoS in terms of noise ratio to peak signal of the established video. Thus they prove the usage of QoS to deliver effective video traces at the receiver end. In [5], they have proposed novel admission control and adaptive admission control protocol that ensures robust and accurate estimation of resources. Thus the proposed scheme performs well compared to other existing approaches regarding cross layer approach. In [6], they propose an ITCD algorithm for MANET networks with QoS support to handle queuing delays, transmission delays and contention delays. The outcomes indicate that ITCD can reduce the delay and increase the mobile ad hoc networks performance. In [7], they extant an adaptive transmission method based on cross layer QoS to adapt the system response to the detected grade of mobility in the environment. In [8], they propose a MM-DSR routing protocol with cross layer algorithm to provide QoS ad hoc network. Thus the video streaming application's performance has been improvised even during high traffic load. In [9], here they propose a cross layer CNVS solution in MANET. With the help of dissemination aided by one-hop neighbors. CNVS cleverly builds resource centric and thus giving the effective network communication at the end. In [10], here they propose an accurate model QoE with GOP level granularity. The resulting optimal rates can be used as a rate feedback for video encoder H.264/AVC. Thus we acquire an improved quality of experience.

III. PROPOSED APPROACH

In our proposed model, we improve the performance of MANET with the help of three effective layers. Physical layer, MAC layer and application layer. To begin with, in Fig.1 mobile ad hoc network with channels is deployed with other parameters. A source node is allocated and its responsibility is to transmit packets of data to the destination node. After the selection of the source node, each transmitted video packet is assigned with time slots and channel parameters. And there comes the next layer called physical layer where channel modeling takes place. This will help in gathering suitable channels for each video packet transmission. Path Loss and gain calculation takes place immediately. Followed by the next layer called MAC layer. In this layer buffer modeling and interference modeling are applied at the MAC layer.

The final layer is the application layer where the video distortion model is effectively developed followed by packet loss computation and reconstruction of packets takes place in case of loss of original packets. At the end the network packets are received at the destination end without any distortions and loss and the overall video quality is effectively improved. To enhance the performance we utilize cross layer method by following the upcoming three models. Wireless channel model – here channel modeling is applied at the physical layer of the MANET network. From this path loss, channel gain and communication speed is estimated effectively. Threshold selection model based on Data Transmission – here channel modeling is considered with the help of threshold value. This value is computed along with probability density function and packet transmission probability is also computed effectively. Interference modeling – here this modeling is applied at the physical layer when in a case where multiple communication sessions interfere with one another in the same network, we use SINR ratio to decode the network packets and encode them at the receiver end without any interference. In order to maximize the PSNR and throughput we use buffer modeling employed at the MAC layer. Thus from this we develop an effective approach for qualitative video transmission between networks.

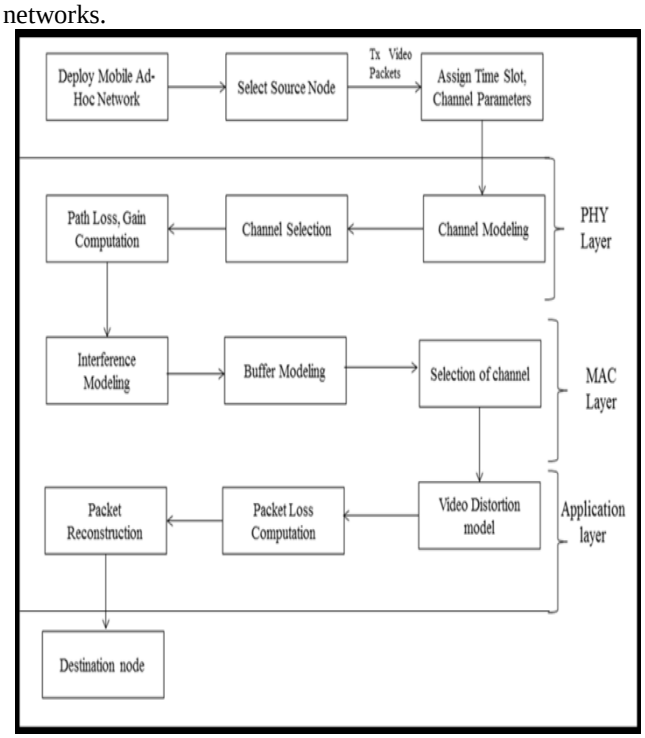

Fig. 1 – MANET with QoS System Architecture

IV. EXPERIMENTAL RESULTS

Accurate evaluation has been done in our proposed model to measure the average throughput performance of the MANET with QoS model, efficient bandwidth performance and delay performance separately. In Fig. 2, the average throughput performance of our MANET model is calculated by showing the comparison between our proposed model and the existing model. We use threshold probability value as the main parameter to achieve this evaluation. At threshold value of 0.05, the average throughput performance of our proposed model is very high reaching 0.45 threshold value. Whereas the existing model reaches only 0.25 threshold value. Similarly for each and every threshold selection probability reading from 0 to 0.55, our proposed model's throughput performance is drastically high compared to the existing MANET models.

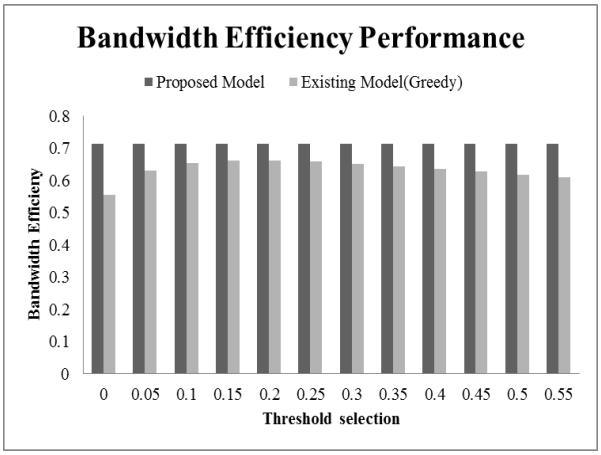

Fig. 2 – Computation of Average Throughput Performance

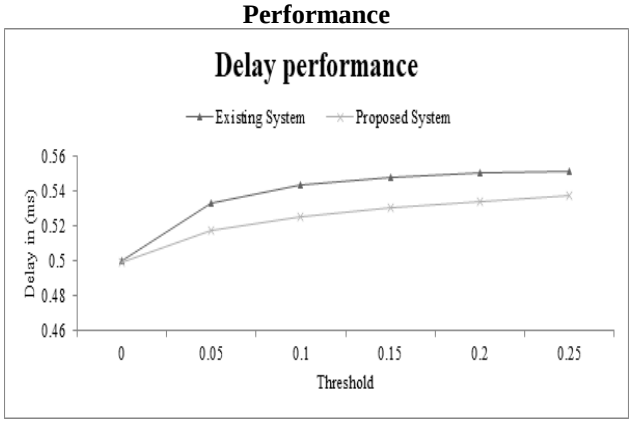

Fig. 3 – Efficient Bandwidth Performance

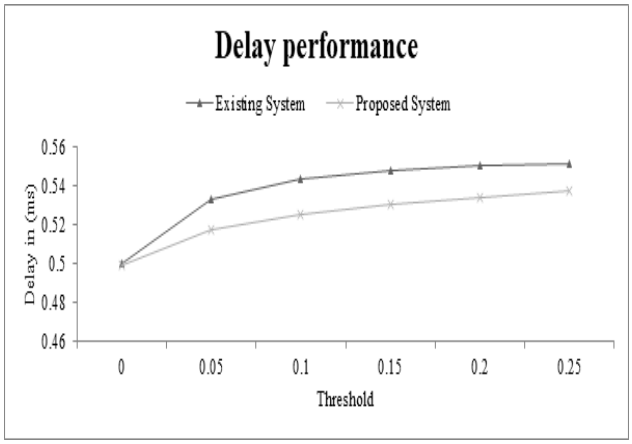

Fig. 4 - Comparison of Delay Performance

In Fig. 3, the efficient performance of bandwidth is computed with the help of threshold selection value for our MANET with QoS model. Here also the performance of our model is very much high compared to the existing greedy models. For each and every threshold selection value from 0 to 0.55 our MANET model's performance is quite amazing.

In Fig. 4, delay performance is calculated with the help of threshold value depicted in milliseconds notation. For the value from 0 to 0.25 threshold and 0.46 to 0.56 time parameter in milliseconds the overall delay of our proposed model is very less appearing in 0.5 reaching below 0.54 whereas the existing model appear in 0.5 and reaching above 0.54. Thus our proposed model's performance in terms of average throughput, bandwidth and delay is very mu higher compared to other greedy existing models.

V. CONCLUSION

Transmission of multimedia files over wireless MANET networks along with QoS support is facing difficulties recently due to delay parameters, resource utilization, traffic maintenance, quality maintenance etc. We have presented a collective scheme of transmission of video packets to develop cross layer and to support QoS for MANET network. To achieve we use channel modeling, data transmission threshold modeling, interference modeling and buffer modeling which will help in the transmission of video packets from source to destination without any packet loss, path delay, distorted packets etc. Thus a qualitative packet transmission is guaranteed in MANET network with QoS support thereby achieving less delay, more average throughput and more bandwidth in performance.

REFERENCES

1. Asha, Dr. G Mahadevan, (2018). A combined scheme of video packet transmission to improve cross layer to support QoS for MANET. *Alexandria engineering journal*, *57*(3), 1501-1508.
2. Ma, C., Li, Y., Yu, H., Gan, X., Wang, X., Ren, Y., & Xu, J. J. (2016). Cooperative spectrum sharing in D2D-enabled cellular networks. *IEEE Transactions on Communications*, *64*(10), 4394-4408.
3. Hanzo II, L., & Tafazolli, R. (2010). QoS-aware routing and admission control in shadow-fading environments for multirate MANETs. *IEEE Transactions on Mobile Computing*, *10*(5), 622-637.
4. Calafate, C. T., Malumbres, M. P., Oliver, J., Cano, J. C., & Manzoni, P. (2009). QoS support in MANETs: a modular architecture based on the IEEE 802.11 e technology. *IEEE Transactions on Circuits and Systems for video technology*, *19*(5), 678-692.
5. De Renesse, R., Friderikos, V., & Aghvami, H. (2007). Cross-layer cooperation for accurate admission control decisions in mobile ad hoc networks. *IET communications*, *1*(4), 577-586.
6. Zhang, X. M., Zhang, Y., Yan, F., & Vasilakos, A. V. (2014). Interference-based topology control algorithm for delay-constrained mobile ad hoc networks. *IEEE Transactions on Mobile Computing*, *14*(4), 742-754.
7. Canales, M., Gallego, J. R., Hernandez-Solana, A., & Valdovinos, A. (2007). Distributed Admission Control for Mobile Ad-Hoc Networks based on a Cross-layer Design. *IEEE Latin America Transactions*, *5*(6), 425-432.
8. Frias, V. C., Delgado, G. D., Ayala, A. Z., & Igartua, M. A. (2007). MM-DSR: Multipath QoS routing for multiple multimedia sources over Ad Hoc mobile networks. *IEEE Latin America Transactions*, *5*(6), 448-456.
9. Shijie, J., Changqiao, X., Muntean, G. M., Jianfeng, G., & Hongke, Z. (2013). Cross-layer and one-hop neighbour-assisted video sharing solution in mobile ad hoc networks. *China Communications*, *10*(6), 111-126.
10. Goudarzi, P., & Hosseinpour, M. (2010). Video transmission over MANETs with enhanced quality of experience. *IEEE Transactions on Consumer Electronics*, *56*(4), 2217-2225.

AUTHORS PROFILE

Asha, received M.Tech degree in Computer Science and Engineering from IIT Bombay in 2001. She is currently a PhD student at computer Science and Engineering Dept., PRIST Deemed to be university, Thanjavur, Tamilnadu in India. Her current research interests are in cross-layer optimizations for multimedia transmission over wireless networks, Network security.

Dr. G. Mahadevan received the M.E degree from the Department of computer Science and Engineering, REC (NIT), Trichy, 1994, and obtained Ph.D degree at Tamil University, Thanjavur, India in 2002. Currently, he is working as a Principal in Annai College of Engineering, Kumbakonam, Tamilnadu, India. His current research interests include Data mining, Network security, cross-layer design of wireless communication networks, Signal processing