MANET ROUTING PROTOCOLS ON NETWORK LAYER IN REALTIME SCENARIO

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ABSTRACT

A Mobile Ad hoc Network comprises of a group of mobile nodes that are connected in wireless medium and they dynamically form a self-organizing mobile network for temporary period of time. Due to ease of deployment, MANET is very effective in situations where it is difficult to create infrastructure based network. Nodes in a MANET are self configured and self governed without being controlled by any central administrator. Mobile Adhoc Network (MANET) has always been a rising technology which supports real time multimedia transmission service, a common trend in current communication technology that uses maximum real time applications with dynamic mobility of the mobile devices. Offering Quality of Service is also an important parameter during communication in real time scenario.Many routing protocols for Mobile Adhoc Network Supporting Real Time Applications have been developed, basic intention being maximum utilization of resource in resource constraint environment, minimum power consumption using limited residual battery power of the highly movable mobile nodes. This paper presents an intensive study and analysis of MANET based effective routing protocols and secondly, it provides report on comparative analysis of efficient real time supported protocols based on power consumption, delay analysis and packet delivery ratio.

KEYWORDS

MANET,AODV,PDR,Throughput,Delay,Real Time Appliction

1. INTRODUCTION

Real time data transmission in Mobile Adhoc Network is a challenging issue due to the self-directed nature of mobile devices which are connected with each other by wireless links. Nodes frequently changes their position and location by forming a network without any base or any infrastructure. Careful considerations have to be made during designing the protocols for real time data transmission which are highly sensitive. Common challenges faced by real time data during transmission are energy utilization, scalability of the network, optimized use of bandwidth, resource reservation, reducing chance of link failure, security, take care of Qos, dynamically changing topology etc.

2. LITERATURE REVIEW

Many researchers have done analysis e regarding successful transmission of real time data over MANETs, some of which are discussed in this section. Scheduling algorithms basically classifies

and categorizes high priority-based real time applications to enhance the efficient delivery of realtime packets in the channel. In paper[11] five types of such scheduling algorithms are examined under real time traffic condition. They are First-In-First-Out (FIFO) Scheduling Algorithm, Priority Queuing Algorithm, Weighted Fair Queuing (WFQ) Algorithm, Class Based Weighted Fair Queuing (CBWFQ) Algorithm and Low Latency Queuing (LLQ) Algorithm.After simulation was done in OPNET, the results were compared and evaluated for the following parameters for the above five algorithms.a.Voice traffic receivedb. video traffic receivedc. voice packet end-to-end delay d. voice packet delay variation.In every case the performance of LLQ algorithm was found to be better with lower delay and higher throughput.

In a dense MANET scenario, where the source is situated far away from the destination, proper data delivery for real-time video streaming is a difficult task. In video traffic flows which is too heavy and need to be continuously flowed without interruption, so sending packets continuously without pause causes congestion of its own flow.In [3] the authors propose a method of periodically delaying the realtimedata transmission specifically video stream at source itself just to avoid more congestion at the next-hop relaying node level.

3. REAL TIME TRAFFIC AND ROUTING PROTOCOLS

Detail study and analysis of Real Time Protocols have been done in this section. Table 1. Provides description of studied protocols and analysis based on Real Time Support.

Table.1 Details of studied and analyzed Protocols

Sl.No	Literature	Year	Protocol/Proposal	Feature	Advantage	Simulation Tool
1	D.Tardioli, *et al* [1]	2015	RT-WMP Real Time Wireless Manet Protocol	Proposes a cross-layer strategy with a novel MAC mechanism	Priority ad mobility support for real-time communications	Real-world application Linux Kernel
2	H.Xie, *et al* [2]	2015	An error-recovery mechanism is proposed for real-time video streaming called MERVS	Transmission of video through multiple channels and priority queue is used	High quality video streaming with FEC (Forward Error Correction)	NS2
3	P.Sondi, *et a*l [3]	2014	A new MANET based strategy to handle real time application is presented	At source periodical delay is maintained to avoid congestion and hence avoids interruption	30% improvement in delivery of video packets between source and destination	OPNET
4	G.Yasin, *et al* [4]	2013	Performance comparison of protocols	Study of different routing protocols, specifically OLSR,AODV,DSR, TORA	Gives idea about the routing nature for real time traffic	OPNET
5	I.Ahmad, *et al* [5]	2013	TSBR-Time Slot Bandwidth Reservation	Presents a technique that provides better QoS using time-slot bandwidth	Reduces queuing delay	NS2

				reservation method		
6	P.Vijaya Kumar, *et al* [6]	2013	A Multicast tree structure protocol	Challenge of transmission of multimedia stream is investigated	A new technique for multimedia stream is presented here	NS2
7	Z.Yuan, *et al* [7]	2013	iPAS-intelligent Prioritized Adaptive Scheme	Mainly discusses suitable routing method for multimedia data	Proposes an efficient scheme called iPAS(Intelligent Prioritised Adaptive Scheme)	Real-life test bed set up with multimedia server
8	R.Viegas, *et al* [8]	2013	A new Real time communication scheme	Proposes a new idea to prioritize real time flow in a network	Proves better throughput for real time data flow	NS2
9	D.Sicignano, *et al* [9]	2013	Real time multi-hop protocol with Qos extension	Proposes the use of multi-hop adhoc network to provide multimedia communication between mobile nodes	Use of low cost s/w and h/w platform to run the protocol, easy to set up solution.	Real application in Somport tunnel, France
10	J.Boksiner, *et al* [10]	2013	MRFM-MANET Real time Frequency Management approach is proposed	Frequency re-use automation, and spectrum sharing with centralized control	Dynamic Spectrum Access capability among MANET radio layer	Real implementation in android device
11	P.Rukmani, *et al* [11]	2013	Analysis of five scheduling algorithm for real time transmission	Voice and video traffic simulated using WFQ & LLQ algorithm.	LLQ(Low Latency Queuing) algorithm improves the overall performance of real time applications	OPNET
12	H.Mewara, *et al* [12]	2013	Evaluation of protocols based on Pattern of traffic and Node density	AODV,DSR,OLSR,TORA are evaluated for delay, n/w load, throughput	Gives a better knowledge of protocol selection for Qos-aware traffic.	OPNET Ver 14.5
13	G.Aujla, *et al* [13]	2013	Evaluation of Behavior of GRP,TORA,OLSR protocols for video conferencing application	Simulation shows that TORA has highest throughput in most scenarios.	Better analysis of protocols to select a suitable one for real time transmission.	OPNET Modeler 14.5
14	C.Lal, *et al* [14]	2013	QARP-Qos Aware Routing Protocol using cross-layer design proposed	Session Admission Control method is used in the protocol	Normal periodic message format can be extended to minimize the effect of mobility	NA

In paper [9] a survey of multi-path video transmission in MANETs has been done. Parameters which were considered during the analysis were Coding methods, Optimal number of streams, video data rate, multi-path routing etc. A coding intrusive algorithm was presented for choosing optimal parameters for successful "network friendly" video transmission over MANET.

4. COMPARATIVE ANALYSIS OF REALTIME PROTOCOLS

Three important real time supported protocols were selected for their performance comparison and analysis to highlight on the functionality used by them in order to improve the network performance in real time scenario. They are RT-WMP[1], MCT[6] and MRFM [10] approach with Real Time Support.

Table 2. Describes studied performance of the three selected protocols.

Table 2. Comparison of Network Performance Parameters in three leading protocols

Protocol	**Power Consumed**	**End to end delay**	**Network Life time**	**PDR**	**QoS Support**
RT WMP	Low	Low	More	High	Medium
MCT	Medium	Medium	Medium	Medium	Low
MRFM	High	High	Low	low	High

5. SIMULATION AND RESULT

We have done simulation of above considered protocols for their performance evaluation based on Packet Delivery Ratio, Power Consumption, Delay and Network Lifetim .Ns 2.35 simulation tool was used for simulation purpose.120 number of nodes were scattered randomly in an area of 2000 x 2000m during beginning of the simulation. In mobility scenario, mobiles nodes were moving in six different speeds within a range of 0 to 10 m/s. Table 3 shows the simulation parameters used in the simulation.

Table 3. Simulation Parameters

Simulation parameters	**Data/Value**
Channel Type	Wireless Channel
MAC Protocol	802.11
Traffic Type	CBR
Packet Size	512 Bytes
No. of Mobile Nodes	120
Simulation Time	600 seconds (10 mins)
Simulation area	2000 x 2000 m
Protocols Name	RTWMP,MCT,MRFM
Model for Node Movement	Random way point
Data rate	11 mbps
Application Type	Video Transmission (Real Time)
Bandwidth	2Mb/s for both
Simulator	Ns2.35

Comparative analysis of the three discussed protocols has been done in the following section based on network parameters such as power consumption, delay rate, packet delivery ratio and network lifetime.

Fig.1 shows the comparison between three Protocols for packet delivery ratio nd it was observed that RTWMP performs better than MCT and MRFM.

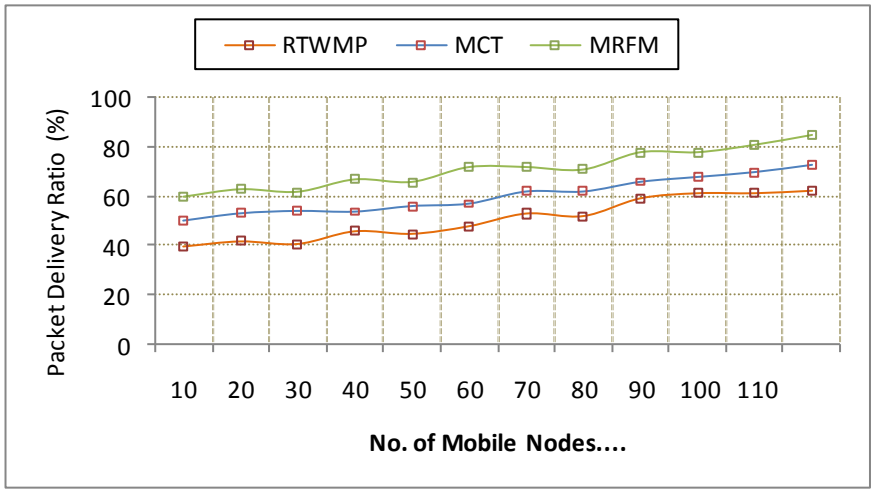

Fig.1 PDR Analysis in Video Conference Application

6. CONCLUSION

The above discussed theme first presents detailed study on challenging protocols, highlights on the mechanisms usded by important real time based routing protocols in MANET and some analysis which has been done to evaluate their performance. Secondly, three leading protocols are selecetd based on specturm distribution in the wireless channel and on the basis of their technical mechanism and approches for comparative analysis, the result of simulation are presented which we believe will be useful for further analysis and development of a robust and versatile realtime based protocol for the magnificent area of MANET.

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