Performance Analysis of Table Driven and Event Driven Protocols for Voice and Video Services in MANET

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Abstract----This research paper encompasses the performance analysis of table driven and event driven routing protocols by using voice and video traffic in mobile Adhoc network (MANET). Particularly, OLSR (table driven) and DSR (Event driven) protocol are considered. The nodes of MANET establish the connections with each other energetically and can move freely in any direction. In mobile Adhoc network, environment event driven and table driven protocols have significant subject matter of study. There is a mobility issue which matters the service performance due to breakage and renewal of links of mobile nodes. Protocols performance has significance on overall performance of MANET. The aim of this study is to present the performance analysis of selected routing protocols by varying the node densities and WLAN physical characteristics. The voice and video traffic applications are configured discretely by using OLSR and DSR in scenarios. Moreover, for the performance observation the parameters are jitter, traffic received, traffic sent, end-to-end delay, traffic load, and throughput. The simulations have been carried out through OPNET 14.5 modeller tool and results has been analysed.

***Keywords*---- MANET, Table & Event Driven Protocols, OPNET.**

I. INTRODUCTION

An important wireless network environment which is a hot topic for researchers is MANET (Mobile Ad hoc Network). It is flavor of mobile wireless communication technology. The Wireless mobile Adhoc network has an important position in the field of networking. MANET depicted as it has self-organized and self-configured network layout in a situation where fixed network could not be deployed. In the MANET environment, all nodes automatically establish connectivity and develop wireless mobile network infrastructure. In this network, each node is without restraint and move independently. In this modern era of advanced technology, the MANET offers best network environment and services. But there are many issues and shortcomings in the MANET. Major issues of devices are mobility, security and scalability. . The security flaws are due to vulnerability of security protocols that degrade the performance of MANET services thus, affecting the mobility and the scalability of devices. Apparently in MANET, there are issues in routing protocols too which affects the MANET services. The connectivity flaws of Nodes degrade the MANET services. These issues occur due to routing protocols of MANET which establish the links between nodes. The goal of this study is to check the performance with the fidelity of table driven and event driven protocols by using voice & video application in MANET. Throughput and delay parameter will be focused. This will help in understanding the trustworthiness by changing the applications and will expose how mobility is affected in the scenario of different environment.

II. PROBLEM STATEMENT

There are two variants of routing protocols in MANET. One is the table driven and another is the event driven protocols. Hence in this study, the table driven protocol OLSR and event driven protocol TORA or DSR performance will be analyzed by using voice application G.729 and G.711 codec and video applications like video conferencing in MANET environment through simulation. The QoS parameters throughput and delay will be focused and the scenario will be developed with different set of nodes density with dynamic mobility. In last, the results of table driven and event driven protocols will be compared by using voice and video application scenarios and will be discussed accordingly. Recommendation will also be provided for improvements.

III. RELATED WORK

MANET is wireless self-organized network technology which is most efficient for that geographical area where fixed network cannot be deployed. The MANET provides the vibrant infrastructure which dynamically can be deployed in a self-organized and self-configured manner [1]. Sharma *et al* analyzed AODV and DSR protocols by using FTP traffic in different scenarios and found the different results according to the nature of traffic. The results of simulation of the DSR routing protocol observed were better as compared to the AODV routing protocol in terms of special traffic parameters. Proactive protocols have good performance having the parameter of routing message overhead and end to end delay [2]. Khan *et al* evaluated framework of QoS and found issues between intermediate nodes during the packet delivery [3]. Mashri *et al* has assessed that OLSR is weak protocol as time of packet delivery is varied [4]. Singla *et al* compared AODV, DSDV and TORA routing protocols by CBR traffic pattern and TCP applications. The results compared by parameters average end to end delay and packet delivery ratio. The AODV is found better performing than DSDV [5]. Nawaz *et al* have observed that there are many architecture issues in the MANET. There are power draw backs, scalability flaws, mobility flaws and security problems in MANET [6]. Pandey *et al* presented the analysis of DSDV, DSR, AODV and ZRP protocols on the basis of average delay, throughput, routing overhead, and packets dropped by using ns-2 simulator [7]. Bhat *et al* focused on proactive, reactive and hybrid protocols (OLSR, AODV, DSR, LAR and ZRP) on the basis of average jitter, average end to end delay and packet delivery ratio by using qualnet simulator. OLSR perform better in dense network [8]. Kuppusamy *et al* have given the descriptive comparison of AODV, TORA and OLSR in light of end to end delay, routing overhead and packet delivery ratio metrics and the analysis shows TORA and AODV perform better than OLSR [9]. Bilandi and Verma focused on OLSR and AODV on the basis of default and varied metrics and evaluated that the performance is varied by node densities [10]. Palaniammal and Lalli has presented an overview of prominent protocols including AODV, DSR and TORA in MANET, pros and cons of these protocols has been described comparatively and it is mentioned that it is hard to decide which one is best [11]. Shrestha and Tekiner have compared selected protocols of MANET by changing network size and analysed the scalability and mobility during routing process. AODV performed better as compared to OLSR and TORA [12]. Shelja and Suresh have proposed modification of OLSR in light of table maintenance that results in improved version of OLSR as compared to existing one. It has been proposed that add one additional field message sequence number to the topology table. [13].Saravanan and Vijayakumar examined the trajectories of reactive and proactive protocols with delay and throughput metrics by using OPNET modeller 16.0 and analysis showed that reactive protocols are better for MANET [14]. Islam *et al* evaluated different codec of voice (G.729, G.728, G.726, G.723, G.711, GSM-HR and GSM-EFR) with similar load of interactive voice. It has been mentioned in this study that G.711 is best solution for small network and GSM-EFR codec is best for large network [15]. Gandhi *et al* presented the evaluation of DSR, OLSR and ZRP by using ns-2 Simulator, and illustrated that DSR performed better as compared to other protocols [16]. Sharma *et al* presented the analysis of AODV, DSDV and ZRP by using ns-2 and illustrated that ZRP is better than AODV and DSDV in terms of metrics which has been used like throughput [17]. Naseer *et al* using multimedia application analysed the TORA, AODV and OLSR with the help of opnet [18]. Gupta evaluated the mobility effect of MANET routing protocols in terms of packet delivery ratio and end to end delay by using ns-2 simulator, and observed AODV performed better [19]. Mostafavi *et al* has reviewed proactive and reactive routing protocols by using FTP traffic, and three parameters end to end delay, load and throughput, analysed with opnet modeller [20]. Morshed *et al* evaluated the DSDV and AODV protocols with QoS metrics by using ns-2 simulator and concluded AODV is efficient as compared to DSDV [21]. Kumar *et al* have highlighted the issues and simulator tools and metrics which have been used in Manet and presented that scalability and reliability are major issues for MANET implementation [22]. Shivahare *et al* have compared the proactive and reactive protocols DSDV, AODV and DSR on the basis of protocol parameters properties in descriptive form [23]. Kaur and Singh compared the OLSR, TORA and GRP on the basis of load, delay and throughput and observed that TORA perform poorly as compared to OLSR and GRP by using OPNET modeler [24].

IV. MANET PROTOCOLS

The Mobile Adhoc network has two variants of routing protocols that perform the routing during communication.

A. Table Driven Routing Protocols (TDRP)

These routing protocols provide the routing information of each node which is available on network. Each node maintains its routing information individually. These protocols send the control message periodically for updating the routing table for every node [9]. In table driven mechanism, nodes keep track of all possible destination routes [19]. There are two prominent protocols which work under the umbrella of table driven method.

a) OSLR (Optimized Link State Routing Protocol)

OSLR works as a link state routing algorithm which is capable to flood the information of links frequently.

b) DSDV (Destination sequence Distance Vector).

On the other hand, the DSDV perform its operation like bellman ford algorithm. It is capable to compute the shortest path from single source vertex to all other vertices. In this research study, OSLR protocol is considered for performance analysis.

B. Event Driven Routing Protocols (EDRP)

These routing protocols provide the routing information when needed; therefore, these protocols are also known as on demand routing protocols. When a source node wants to communicate or send packet to destination node. The event driven routing protocols invoke the mechanism of discovery of route and know the destination route. The route remains active until the communication session needed it to be active [9]. The node discovers the route when needed on demand [19]. There are few prominent events driven routing protocols.

a) AODV (Adhoc On demand Distance Vector)

The AODV routing protocol algorithm offers route to the nodes when the source node request the route. It helps the nodes to easily enter and leave the network when needed. AODV Supports both unicast and multicast mechanism by performing distance vector routing.

b) DSR (Dynamic Source Routing)

DSR is the EDRP based routing protocol. It has two mechanisms. One is the route discovering and other is route maintenance. These mechanisms perform function together and allow the mobile nodes to discover the route and maintain the connectivity in mobile Ad hoc network. In this study, the DSR selected for performance analysis with OLSR protocol.

c) TORA (Temporary ordered Routing Algorithm).

V. MANET APPLICATION

The MANET easily adds and removes the devices and maintains connectivity. It can be deployed anywhere, where infrastructure of network is not available, inconvenient or non-existing. Initially, MANET was developed and derived for the military application to serve the purpose of network survivability and easy development. There are few mobile Adhoc network applications which have been mentioned below.

- MWB (Military War/ Battlefield)
- LL (Local Level)
- CL (Commercial Level)
- WMN (Wireless Mesh Network)
- HWN (Hybrid Wireless Network)

During war in battlefield, military can easily developed their mobile network by using MANET MWB platform and easily maintain their communication between troops, companies and headquarter. LL, a mobile network that can be developed for hospitals, stadiums, boats and likewise and it can maintain communication for temporary time. . CL can be helpful during disaster and emergency for relief operation for example during earthquake, flood and fire where fixed infrastructure of network is unavailable. WMN is an important application through which a separate infrastructure can be provided that can help people on their residence and business locations as alternate solutions without spectrum reuse and planning, where cellular network does not support sometimes. HWN is the solution of mobile ad hoc networking which supports the other applications for example ITS (Intelligent transport system), LE, CN and communication.

VI. MANET METRICS

A. Transmission Range

The power constraint limits the transmission range parameter due to reuse of frequency and effects of channel [22]. Transmission range depends on the transmit power. It has been derived from mathematical formula which is given below.

$$P = \left(\frac{4\pi D}{0.12476}\right)^2 * 10^{-11.1} \qquad \text{(eq. 1)}$$

The power value which has been used is 0.005 watt. The transmission range is required. The above formula shows that D is the transmission range. Hence the transmission range can be calculated by deriving the above equation.

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=POWER ((4*3.14*B1/0.12476), 2)*POWER (10,-11.1)
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(eq. 2)

The following transmission ranges has been calculated in table 1 by using above formula:

Table 1. Transmission range

Transmit Power (w)	Transmission Range(m)
0.000805876	100
0.001813221	150
0.003223504	200
0.005036725	250
0.007252885	300
0.009871982	350
0.012894017	400
0.016318991	450
0.020146902	500
0.024377751	550

B. Transmit Power

The transmit power is a feature of Wireless LAN (WLAN) which has an impact on communication directly and by increasing the Transmit power, the transmission range can be increased in MANET. Moreover, it is proved through

Mathematical formula of transmission range that increasing transmit power can directly impact transmission range. It indicates that transmission power directly impact on the performance of MANET protocols.

C. Jitter

The packet arrival time variation is known as jitter [9]. The delay or latency variations are also known as jitter. For the better performance, the delay or jitter should be minimum [21].

C. Packets sent

The data traffic sent by all mobile nodes using routing protocols in MANET during transmission or total number of packets sent by mobile nodes from source to destination.[19]

D. Packet Received

It is explained as data traffic received by the destination nodes during communication from source node. The received packets can be measured by subtracting lost packets and dropped packets from sent packets [19]

E. Packets Dropped

The data traffic is sent in the form of packets to the destination from source nodes but it could not reach the destination due to error condition. It is known as Packet dropped [19, 21].

F. Media Access Delay

The time required accessing a media to mobile node or mobile work station for packet transmission is known as media access delay. Initially, when packet is sent to physical layer the delay is recorded for each packet [9]. Media Access Delay may occur because of the network congestion [25].

G. Network Load

The network load corresponds to total number of bps assigned to WLAN layers for higher layers to all nodes of WLAN in the network [15]

H. End to End Delay

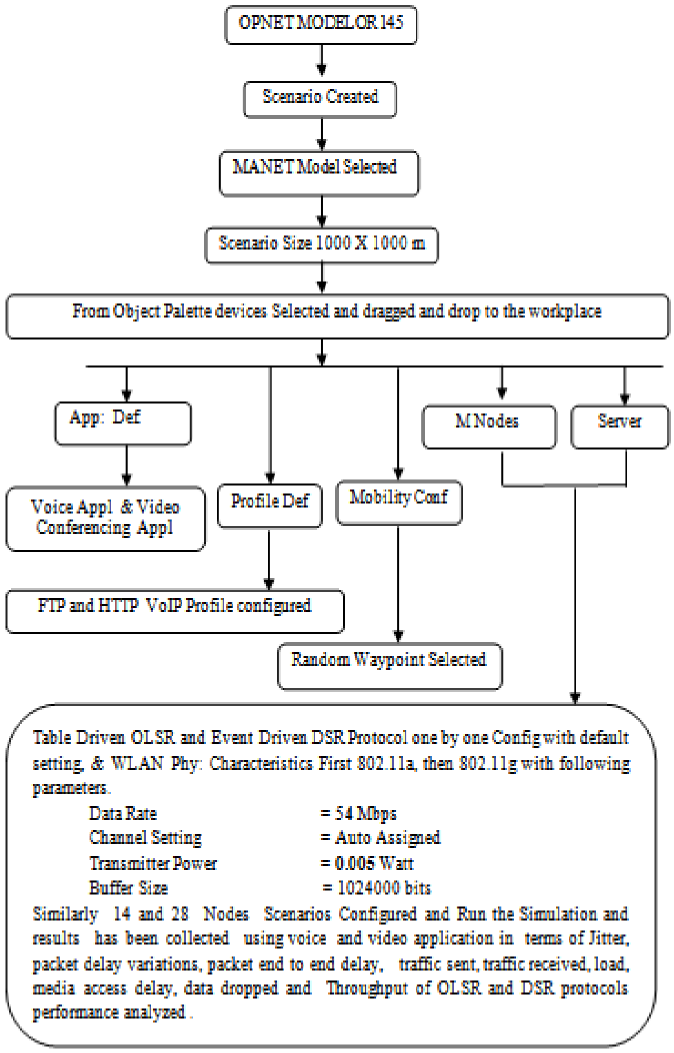
It is a metric or parameter that shows how much time is needed by a packet travelling from one end to another end. End to end delay having all possible delays' due to buffering in route discovering latency, propagation delay or queuing delay, are measured in seconds. The difference of sent time and receive times of packets is known as end to end delay [9, 21]. The packet end to end delay is an average time that a packet takes in transit from source to destination. *End to end delay* is a gauge which shows the routing protocols reliability using all constraints of the MANET [20].

I. Throughput

The ratio of data amount reaches from source to destination with respect of time taken by the destination to receive last packet is referred as throughput [9]. The throughput can be expressed in bps or packets per second. The phenomenon of topology change frequently effect this metric in MANET [9]. It has been analyzed in different MANET wireless environment with different metrics. The data packets successfully reached at destination, the average rate is known as throughput. Throughput is measured in bps [9].

VII. RESEARCH METHODOLOGY

The research methodology or proposed approach which has been used in this study is the OPNET tool. In this research, performance has been analysed by evaluating the Table driven (OLSR) and event driven (DSR) MANET protocols by using voice and video traffic applications. The opnet 14.5 modeller has been used. The flow chart is mentioned below illustrates step by step activities of this study.



Flow Chart 1.

VIII. EXPERIMENTAL WORK AND DISCUSSION

The experimental work is carried out by using simulation tool OPNET modeler 14.5. 2 scenarios have been developed having 14, 28 nodes. With default setting, the table driven protocol OLSR and event driven protocol DSR has been configured in both scenarios. The Wireless LAN physical characteristics standard 802.11a has been configured initially by using voice traffic. After the simulation, results were collected. Then the Wireless LAN physical characteristics standard 802.11a has been configured with video traffic. The simulation was carried out and results were collected. Similarly, the WLAN physical characteristics standard was changed as 802.11g and was configured in both scenarios by using similar attributes of traffic configuration. The simulations were carried out and the results were obtained and discussed. On other hand, the Wireless LAN attribute transmit power (w) was set to 0.005 w for both scenario node densities. The Scenarios Main Characteristics has been given below in table 2.

Table. 2

Scenarios Parameters	**Scenario Values**
Simulation tool	*PNET 14.5*
MANET Protocols	*OLSR, DSR*
Campus Network Scenario Size	*1000x1000 m*
Number of Mobile Nodes	*14, 28*
Data Rate	*54 Mbps*
Application Name	*Voice and Video Traffic*
Wireless LAN Phy Characteristics	*802.11a and 802.11g*
Network Protocol	*IP*
Mobility model	*Random Waypoint*
Scenario Simulation Time	*30 min*

The Wireless LAN attribute Values has been given below in table 3.

Table. 3

Wireless LAN Parameters	**Wireless LAN Parameters Values**
Channel Setting	*Auto assigned*
Transmitter Power	*0.005 Watt*
Transmission Range	*250 m*
Fragmentation Threshold	*1024 bytes*
Buffer Size	*1024000 bits*
Mobile Node Speed	*10 m/s*

The following 2 scenarios illustrated in figure 1 and 2 are developed by using above parameters, values and attributes having 14 and 28 nodes according to given tabular values.

A. Experimental Work Simulation Scenarios 1.

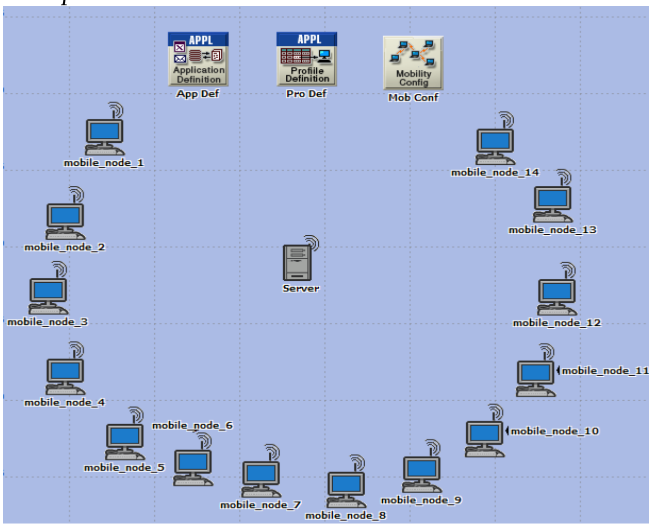


Fig. (1). Scenario 1

B. Experimental Work Simulation Scenarios 1.

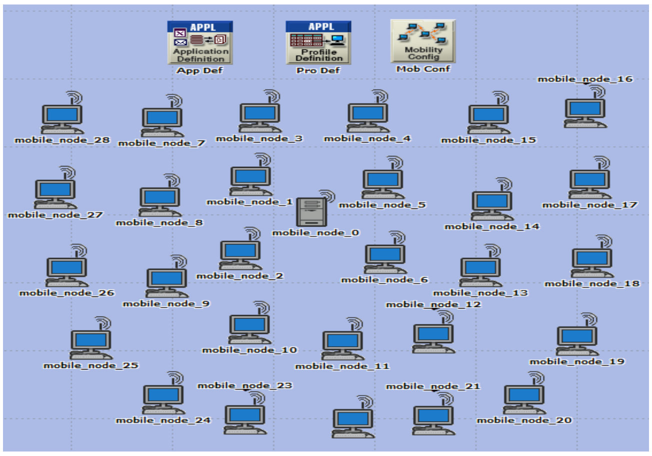


Fig. (2). Scenario 2

By using OPNET Modeler 14.5, MANET campus network has been designed with configuration of 1000x1000 meters. Two scenarios have been developed by drag and dropping the network nodes from object palette of MANET model. The network nodes include profile definition, mobility configuration, application definition server and mobile workstations dragged from object palettes and dropped at the workplace. Moreover, the application definition was configured with voice and video traffic separately. Primarily, the name of application definition was changed than application attributes having voice codec G.729 and video conferencing application configured with high resolution description. After that, profile definition was configured. Similarly, the name has been changed and FTP and HTTP services configured and application Voice and video conferencing were configured. The mobility configuration configured with random way point and name was also updated. The server was configured. Initially, name was changed than MANET protocols event driven (DSR) and table driven (OLSR) was configured with default setting. Server application support profile was configured and updated with the supported services. Wireless LAN bearing Physical Characteristics, features and parameters was configured. The physical characteristics of WLAN 802.11a configured with parameters as, data rate 54 mbps, auto assigned channel setting, (0.005 watt) transmitter power, 1024 fragmentation threshold and 1024000 bits buffer size was configured. The scenario 1 simulation time was set at 30 minutes. After this configuration, simulation was carried out. After completion of the simulation, the results were collected. Similarly, scenario 1 having 14 nodes was configured with same values and same parameters by changing video traffic application. The simulation was carried out. After completion of the simulation, the results were collected. After these simulations, the WLAN physical environment of the scanerio1 was changed from 802.11a to 802.11g by configuring the data rate 54 mbps, auto assigned channel setting, (0.005 watt) transmitter power, 1024 fragmentation threshold and 1024000 bits buffer size. The scenario 1 simulation time was set at 30 minutes. After simulation the results were collected.

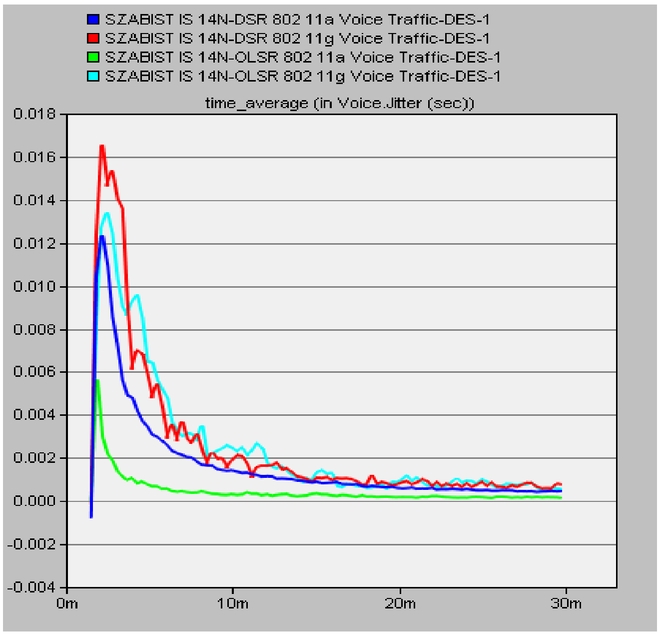


Fig. (3). Voice Traffic Jitter

In the above Figure 3, it has been observed that in WLAN 802.11a environment for voice traffic, DSR protocol has jitter value 0.012 seconds and OLSR protocol has jitter value is 0.05 seconds. On the other hand in WLAN 802.11g environment for voice traffic, DSR has jitter value 0.017 seconds and OLSR protocol has jitter value 0.013 seconds.

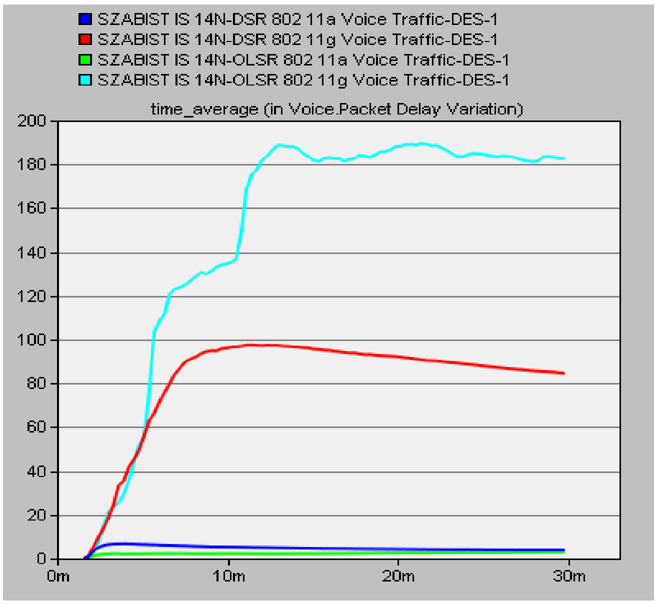


Fig. (4). Voice Traffic Packet Delay Variations

In the above Figure.4, it has been observed that in WLAN 802.11a, atmosphere for voice traffic DSR protocol has Packet Delay Variations of 5 seconds and OLSR protocol has Packet Delay Variations of 4 seconds. On the other hand, in WLAN 802.11g, atmosphere for voice traffic DSR has Packet Delay Variations of 85 seconds and OLSR protocol has Packet Delay Variations of 182 seconds. In 802.11a, atmosphere packet delay variation of OLSR is lower than DSR and contrary in 802.11g atmosphere packet delay variation of OLSR is greater than DSR.

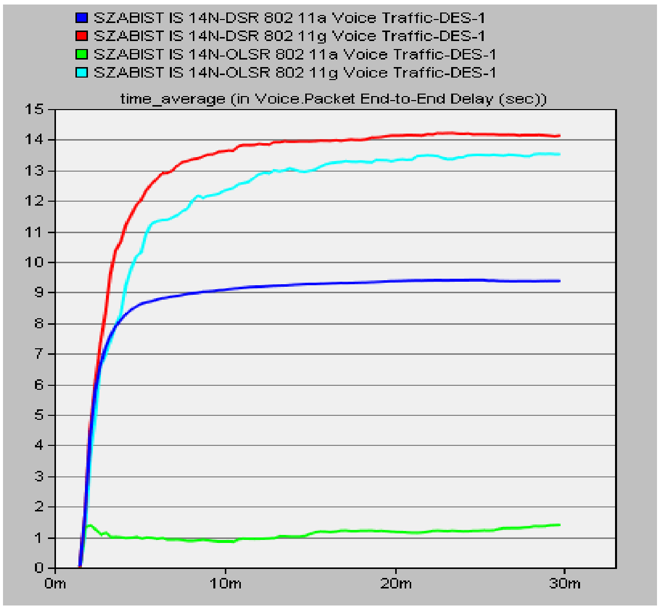


Fig. (5). Voice Traffic Packet End to End Delay

In the above Figure 5, it has been observed that in WLAN 802.11a environment, for voice traffic packet end to end delay of DSR has 9.5 seconds and OLSR protocol has 1.5 seconds packet end to end delay. On other hand, in WLAN 802.11g environment, DSR has 14 seconds packet end to end delay and OLSR has 13.5 seconds packet end to end delay. Here, DSR has greater packet end to end delay to OLSR.

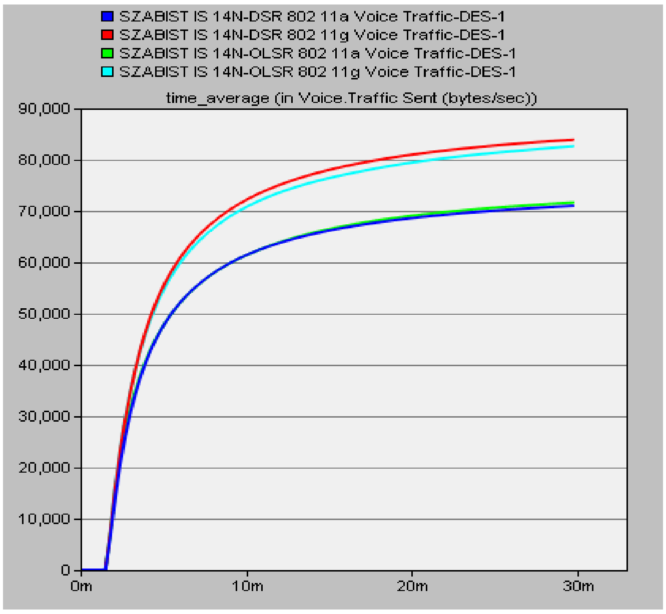


Fig. (6). Voice Traffic Sent

In the above Figure.6, it has been observed that in WLAN 802.11a atmosphere, the voice traffic sent by DSR is 70 kilo bytes/ seconds or 560 kbps and OLSR protocol has sent 71 kilo bytes/ seconds or 568 kbps. On other hand, in WLAN 802.11g atmosphere, voice traffic sent by DSR is 85 kilo bytes/seconds or 680 kbps and OLSR protocol has sent 83 kilo bytes/seconds or 664 kbps .

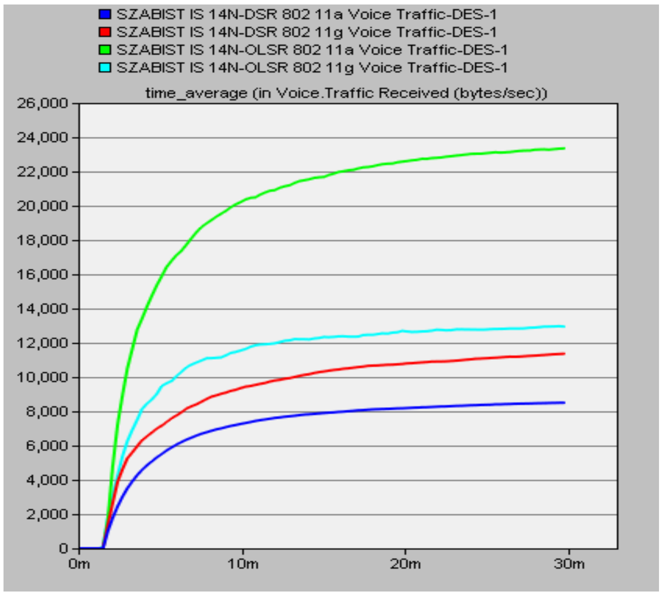


Fig. (7). Voice Traffic Received

In the above Figure 7, it has been observed that in WLAN 802.11a atmosphere, the voice traffic received by DSR is 8.2 kilo bytes/ seconds or 65.6 kbps and OLSR protocol has received 23.5 kilo bytes/ seconds or 188 kbps. On other hand, in WLAN 802.11g atmosphere, voice traffic received by DSR is 11.2 kilo bytes/seconds or 89.6 kbps and OLSR protocol has received 12.5 kilo bytes/seconds or 100 kbps.

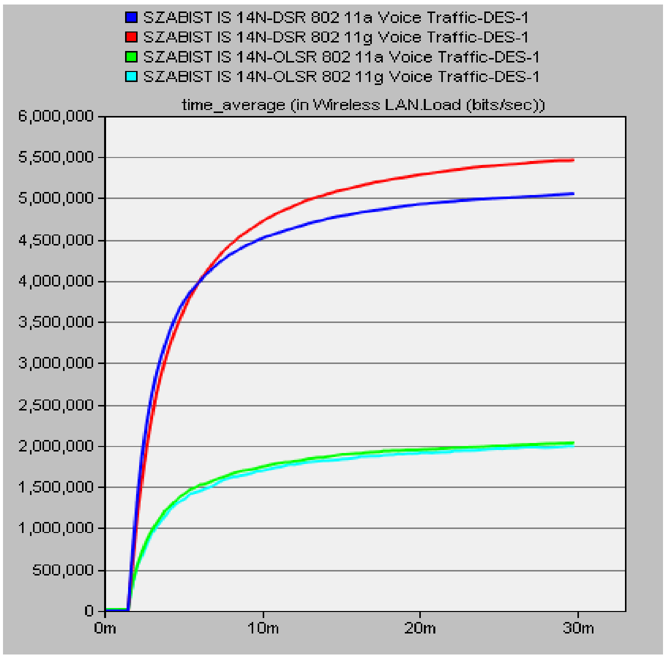


Fig. (8). Voice Traffic Load

In the above Figure 8, it has been observed that in WLAN 802.11a environment, voice traffic network load of DSR is 5 mbps and OLSR protocol has 2 mbps network load. On other hand, in WLAN 802.11g environment, voice traffic network load of DSR is 5.5 mbps and OLSR protocol has 2 mbps network load. In both WLAN physical characteristics, the DSR protocol has greater network load as compared to OLSR.

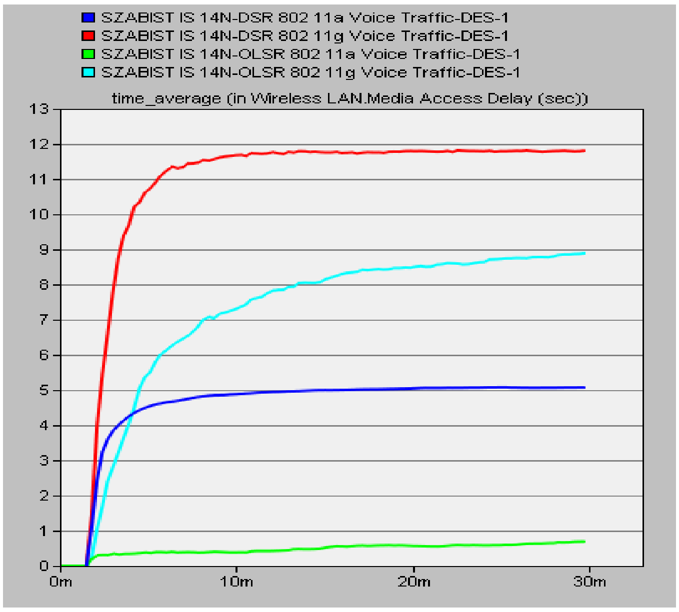


Fig. (9). Voice Traffic Media Access Delay

In the above Figure 9, it has been observed that in WLAN 802.11a environment, media access delay of DSR is 5 seconds and OLSR has 0.7 media access delay. On other hand in WLAN 802.11g environment, DSR has 12 seconds media access delay and OLSR has 9 seconds media access delay. It has been observed that DSR has lower media access delay in both physical characteristics of WLAN.

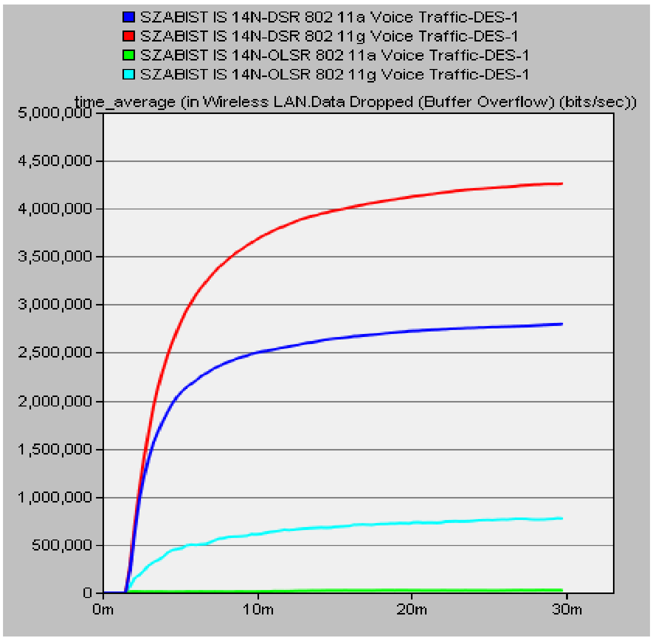


Fig. (10). Voice Traffic Data Dropped

In the above Figure 10, it has been observed that in WLAN 802.11a environment, voice traffic DSR has dropped data 2.7 mbps and OLSR protocol dropped data 0.1 mbps. On the other hand, in WLAN 802.11g environment, for video traffic DSR has dropped data 4.25 mbps and OLSR protocol has dropped the data 0.75 mbps. The DSR protocol has greater data dropped as compared to OLSR protocol.

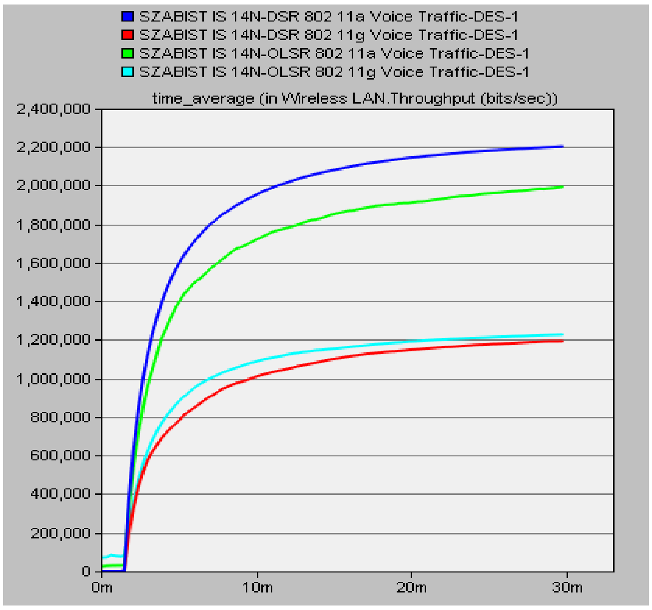


Fig. (11). Voice Traffic Throughput

In the above Figure 11, it has been observed that in WLAN 802.11a environment, for voice traffic DSR has 2.2 mbps throughput and OLSR protocol have 2 mbps throughput. On other hand, in WLAN 802.11g environment for voice traffic DSR has 1.2 mbps throughput and OLSR protocol has 1.22 mbps.

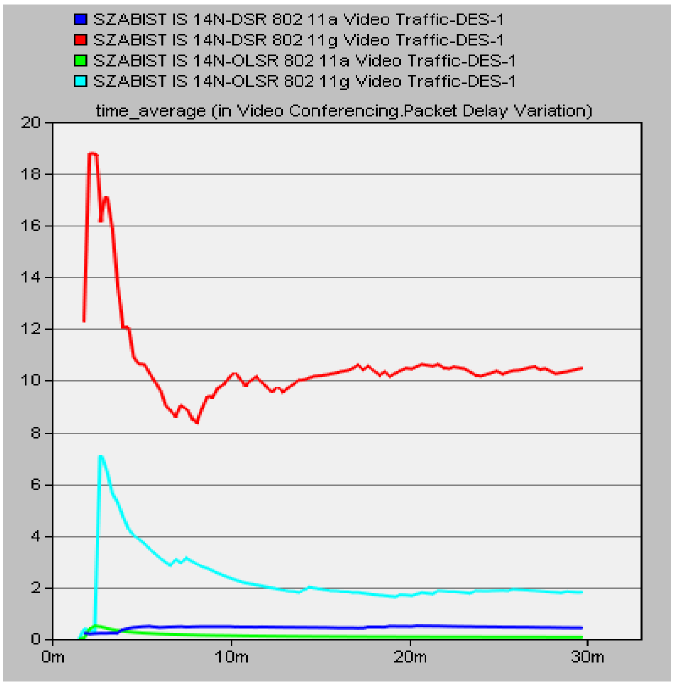


Fig. (12). Video Traffic Packet Delay Variations

In the above Figure 12, it has been observed that in WLAN 802.11a atmosphere, for video traffic DSR protocol has Packet Delay Variations of 0.4 seconds and OLSR protocol has Packet Delay Variations of 0.1 seconds. On the other hand, in WLAN 802.11g atmosphere for video traffic DSR has Packet Delay Variations 19 seconds and OLSR protocol has Packet Delay Variations of 7 seconds. In video traffic, a packet delay variations of OLSR is lower than DSR in both WLAN physical characteristics.

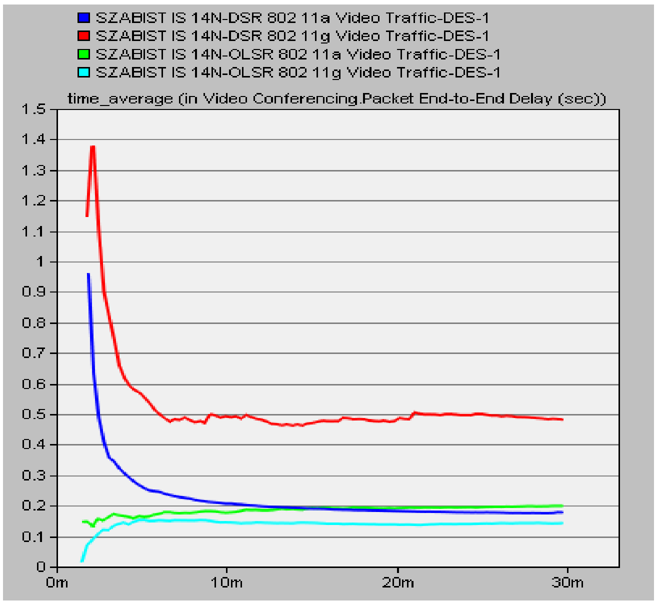


Fig. (13). Video Traffic Packet End to End Delay

In the above Figure 13, it has been observed that in WLAN 802.11a environment, for video traffic packet DSR has 0.96 seconds end to end delay and OLSR protocol has 0.2 seconds of packet end to end delay. On other hand, in WLAN 802.11g environment, DSR has 1.37 seconds packet end to end delay and OLSR has 0.15 seconds packet end to end delay. The DSR has greater packet end to end delay as compared to OLSR.

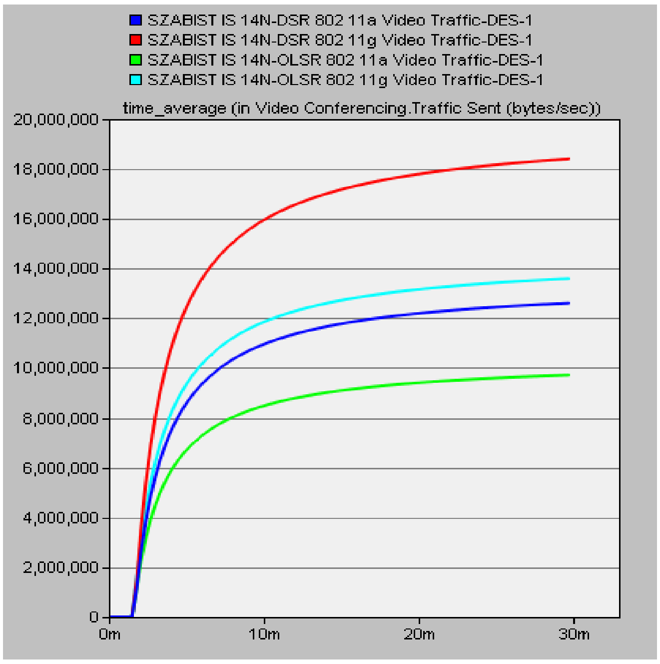


Fig. (14). Video Traffic Sent

In the above Figure 14, it has been observed that in WLAN 802.11a atmosphere, the video traffic sent by DSR is 12.3 megabytes/ seconds or 98.4 mbps and OLSR protocol has sent 9.4 megabytes/ seconds or 75.2 mbps. On other hand, in WLAN 802.11g atmosphere, video traffic sent by DSR is 18.2 megabytes/seconds or 145.6 mbps and OLSR protocol has sent 12.8 megabytes/seconds or 102.4 mbps.

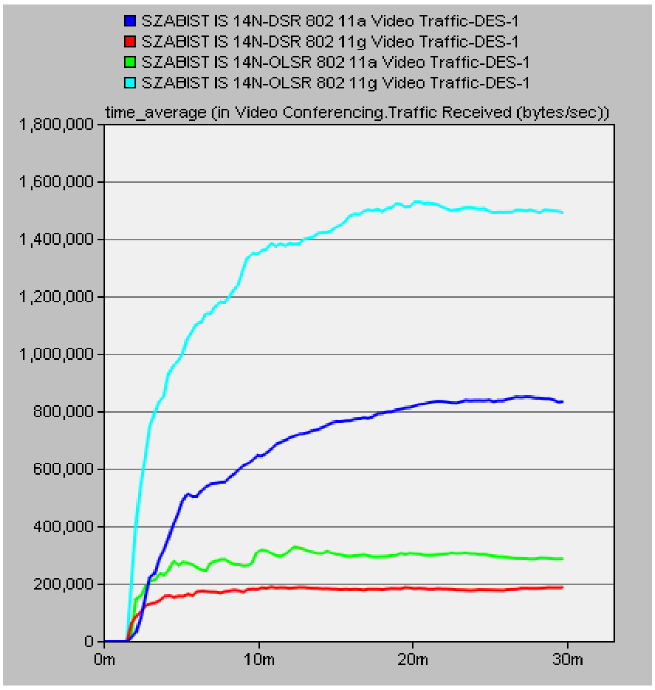


Fig. (15). Video Traffic Received

In the above Figure 15, it has been observed that in WLAN 802.11a atmosphere, the video traffic received by DSR is 800 kilo bytes/ seconds or 8.4 mbps, and OLSR protocol has received 300 kilo bytes/ seconds or 2.4 mbps. On other hand, in WLAN 802.11g atmosphere, video traffic received by DSR is 200 kilo bytes/seconds or 1.6 mbps and OLSR protocol has received 1500 kilo bytes/seconds or 12 mbps.

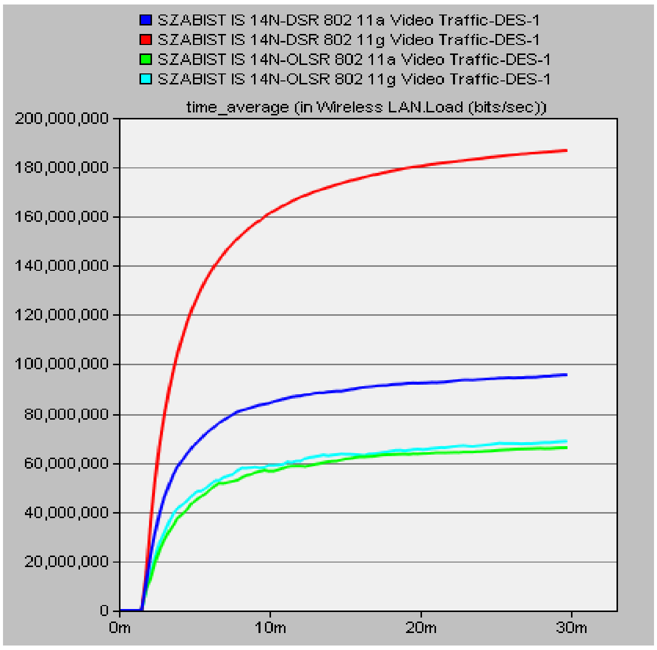


Fig. (16). Video Traffic Load

In the above Figure 16, it has been observed that in WLAN 802.11a environment for video traffic, the network load of DSR is 96 mbps and OLSR protocol has 65 mbps network load. On other hand, in WLAN 802.11g environment for voice traffic, network load of DSR is 186 mbps and OLSR protocol has 70 mbps network load. The DSR protocol has greater network load as compared to OLSR.

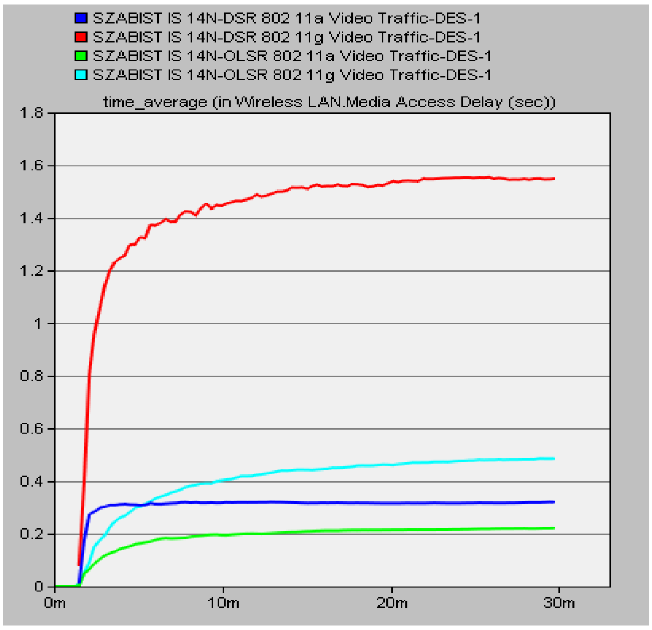


Fig. (17). Video Traffic Media Access Delay

In the above Figure 17, it has been observed that in WLAN 802.11a environment for video traffic, media access delay of DSR is 0.3 seconds and OLSR has 0.21 seconds of media access delay. On other hand in WLAN 802.11g environment for video traffic, DSR protocol has 1.55 seconds of media access delay and OLSR has 0.5 seconds of media access delay. It has been observed that DSR has greater media access delay in both physical characteristics of WLAN.

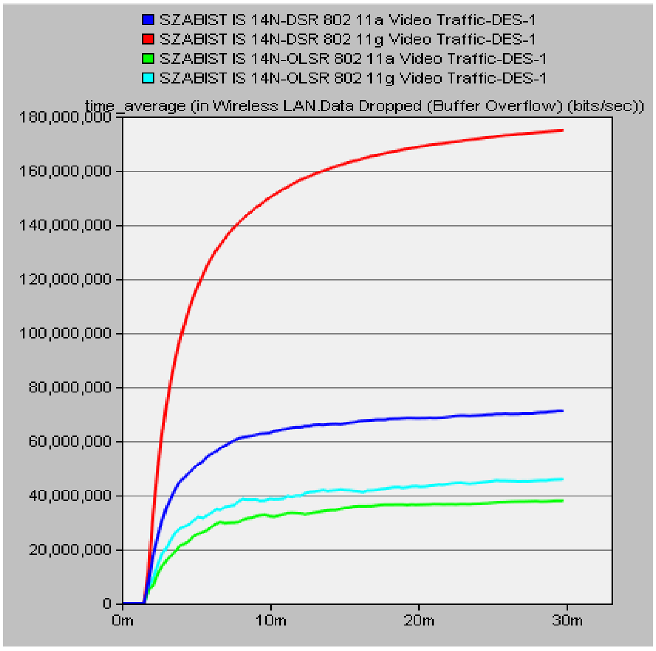


Fig. (18). Video Traffic Data Dropped

In the above Figure 18, it has been observed that in WLAN 802.11a environment for video traffic, DSR has dropped 70 mbps data and OLSR protocol dropped data 40 mbps. On the other hand in WLAN 802.11g environment for video traffic, DSR has dropped data 178 mbps and OLSR protocol has dropped the data 47 mbps. The DSR protocol has greater data dropped as compared to OLSR protocol in both WLAN environments.

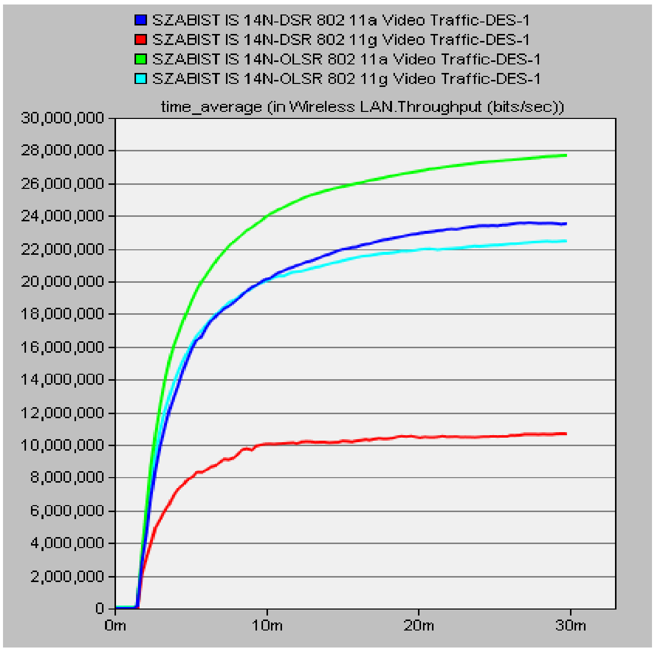


Fig. (19). Video Traffic Throughput

In the above Figure 19, it has been observed that in WLAN 802.11a environment for video traffic, DSR has 23.8 mbps throughput and OLSR protocol have 28 mbps throughput. On other hand in WLAN 802.11g environment for video traffic, DSR has 10.8 mbps throughput and OLSR protocol has 22.3 mbps. In performance comparison, OLSR protocol has greater throughput than DSR.

IX. RESULTS ANALYSIS OF EXPERIMENTAL WORK OF SCENARIO 1 AND SCENARIO 2

Table. 4

SCENARIO 1 VOICE TRAFFIC				
Data Traffic Type	Voice Traffic		Voice Traffic	
WLAN Phy Characteristics	WLAN 802.11a		WLAN 802.11g	
Protocol	DSR	OLSR	DSR	OLSR
Node Density	14			
Jitter	0.012 sec	0.05 sec	0.017 sec	0.013 sec
Packet Delay Variations	5 sec	4 sec	85 sec	182 sec
Packet End to End Delay	9.5 sec	1.5 sec	14 sec	13.5 sec
Voice Traffic Sent	560 Kbps	568 kbps	680 kbps	664 kbps
Voice Traffic Received	65 kbps	184 kbps	88 kbps	104 kbps
WLAN Traffic Load	5 mbps	2 mbps	5.5 mbps	2 mbps
WLAN Media Access Delay	5 sec	0.7 sec	12 sec	9 sec
WLAN Data Dropped	2.7 mbps	0.1 mbps	4.25 mbps	0.75 mbps
WLAN Throughput	2.2 mbps	2 mbps	1.2 mbps	1.22 mbps

Table. 5

SCENARIO 1 VIDEO TRAFFIC				
Data Traffic Type	Video Traffic		Video Traffic	
WLAN Phy Characteristics	WLAN 802.11a		WLAN 802.11g	
Protocol	DSR	OLSR	DSR	OLSR
Node Density	14			
Packet Delay Variations	0.4 sec	0.1 sec	19 sec	7 sec
Packet End to End Delay	0.96 sec	0.2 sec	1.37 sec	0.15 sec
Video Traffic Sent	12.3 mbps	9.4 mbps	18.2 mbps	12.8 mbps
Video Traffic Received	0.82 mbps	0.3 mbps	0.2 mbps	1.5 mbps
WLAN Traffic Load	96 mbps	65 mps	186 mbps	70 mbps
WLAN Media Access Delay	0.3 sec	0.21 sec	1.55 sec	0.5 sec
WLAN Data Dropped	70 mbps	40 mbps	178 mbps	47 mbps
WLAN Throughput	23.8 mbps	28 mbps	10.8 mbps	22.3 mbps

Table. 6

SCENARIO 2 VOICE TRAFFIC				
Data Traffic Type	Voice Traffic		Voice Traffic	
WLAN Phy Characteristics	WLAN 802.11a		WLAN 802.11g	
Protocol	DSR	OLSR	DSR	OLSR
Node Density	28			
Jitter	0.019 sec	0.007 sec	0.019 sec	0.028 sec
Packet Delay Variations	120 sec	100 sec	280 sec	440 sec
Packet End to End Delay	22 sec	8 sec	31 sec	34.5 sec
Voice Traffic Sent	424 kbps	440 kbps	432 kbps	440 kbps
Voice Traffic Received	63.2 kbps	140 kbps	64 kbps	65.6 kbps
WLAN Traffic Load	5.2 mbps	2.2 mbps	4.8 mbps	1.9 mbps
WLAN Media Access Delay	14 sec	4 sec	23.3 sec	20.1 sec
WLAN Data Dropped	3.3 mbps	0.7 mbps	3.7 mbps	0.2 mbps
WLAN Throughput	17 mbps	21 mbps	11.2 mbps	12 mbps

Table. 7

SCENARIO 2 VOICE TRAFFIC				
Data Traffic Type	Video Traffic		Video Traffic	
WLAN Phy Characteristics	WLAN 802.11a		WLAN 802.11g	
Protocol	DSR	OLSR	DSR	OLSR
Node Density	28			
Packet Delay Variations	88 sec	1 sec	72 sec	3 sec
Packet End to End Delay	13.2 sec	0.2 sec	7.8 sec	0.9 sec
Video Traffic Sent	29 mbps	21 mbps	36 mbps	38 mbps
Video Traffic Received	80 kbps	280 kbps	139 kbps	40 kbps
WLAN Traffic Load	270 mbps	95 mbps	370 mbps	230 mbps
WLAN Media Access Delay	2.5 sec	0.7 sec	2.43 sec	1.35 sec
WLAN Data Dropped	255 mbps	70 mbps	355 mbps	215 mbps
WLAN Throughput	10.5 mbps	23 mbps	14 mbps	18 mbps

X. CONCLUSION

This research paper provides comprehensive performance analysis of table driven (OLSR) and event driven (DSR) protocol of Mobile Adhoc Network using voice and video application services and different node densities with different WLAN physical characteristics such as; WLAN 802.11a and WLAN 802.11g. It evident in table 4, 5, 6 and 7 that when the voice application is used in MANET plate form, the OLSR and DSR performance varies in WLAN 802.11a and 802.11g environment. The analysis shows that the voice traffic received and throughput in OLSR is greater than DSR.

Moreover, the traffic load, media access delay and data dropped are grater in DSR as compared to OLSR. From this observation, it can be concluded that OLSR has better performance than DSR but it is table driven. However, there were few variations observed in the behaviour of protocol when the node density was changed from 14 nodes to 28 nodes. When the video applications was used with same setting in MANET plate form; the OLSR and DSR performance varied as compared to voice application. These protocols perform better in high load. The throughput is greater in video traffic as compared to voice traffic. Similarly, OLSR performed better in terms of throughput in both WLAN 802.11a and 802.11g environment. WLAN 802.11g proved to be a better platform for table driven and event driven protocols in terms of providing better services as compared to 802.11a. The table driven and event driven routing protocol metrics performance varied. It depends on the application type, WLAN physical characteristics and number of nodes. In this regards, these protocols behavior were found to be changed. The transmission power and transmission range also have impact on these protocol performance.

XI. FUTURE WORK

In MANET, there are architecture issues, transmit power issues, mobility issues, scalability issues and security issues. The routing protocol algorithms could be improved for the better performance. These are vast areas in which research can be carried out and Mobile Adhoc Network can be improved.

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