ANALYSIS OF SCHEDULING ALGORITHMS FOR CONGESTION AND NON-CONGESTION BASED VANET SCENARIO

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Abstract : Wireless technology provides effective and efficient communication between the mobile devices. Vehicular Ad-hoc Network (VANET) is the most influencing field to researchers due to vehicle density, traffic congestion, accidents, etc. In order to overcome these problems, several research works are going on especially in the field of the communication among moving nodes and resources. The necessity of efficient scheduling algorithm is highly required for successful exploitation of a broadcast medium and data transmission. Data scheduling becomes an important issue when vehicles access data through Road Side Unit (RSU). Therefore, to deliver the messages to the recipient properly and accurately, scheduling algorithms have to be emphasized in VANET. Here various data scheduling policies are described to manage the data accessibility from the RSU's to the vehicles. This project presents the categorization of the scheduling algorithm on the basis of a type of parameters used in the distribution of data items. This analyzes the efficiency of data scheduling algorithms in VANET by considering various parameter metrix. Qualnet 6.1 simulator is used to simulate the VANET scenario. By comparing these scheduling algorithms on the basis of various performance metrics the reached conclusion is that different scheduling algorithm gives the best results for different application, depending upon the type of application one can select the best scheduling algorithm as per needed on the basis of above analysis.

Index Terms – Qualnet, Scenario, VANET, RSU

I. INTRODUCTION

In the course of the last decennium, density of traffic has been growing at an alarming rate. This has led to un ambivalent congestion and vehicle accommodation problem. Inadequacy of road safety and security increases the vulnerability of accidents and takes the valuable lives of people. It also poses a risk on environment. The above problems can be addressed using an advanced technology called VANET. VANET stands for vehicular ad-hoc network . Basically VANET provides three kinds of services namely safety management, traffic management and internet services like, so that safety and comfort can be provided to the road users. The communication between these nodes is through the wireless links mounted on each vehicle. The nodes can act as both participant among the vehicles or as router for vehicles.

In addition , the RSU's may act as a server and therefore they can prepare diverse types of information to vehicles on roads. Since the number of vehicles is large with respect to various types of files scheduling schemes will be a challenge. Therefore various scheduling schemes that would increase the performance of the network are considered.One of the most important goals in scheduling scheme is that it serves more requests and specially served most important requests as far as possible. This challenge will be more important when number of requests increased. Another challenge is quality of service which RSU prepares for vehicles. This challenge will be fundamental when types of services are video or audio. It means that when a vehicle asks for the online video, RSU should give high priority to these services because online video should be delivered without delay or jitter.

II. METHODOLOGY

It is well known fact that as large number of requests may arrive at the data center, scheduling these requests in a proper and efficient way is a challenge. Without consideration of such priorities, emergency messages can be treated as general and can be delayed, blocked and dropped by lower-priority messages, which are not urgent and can wait for later transmission. Here following Scheduling algorithms and queuing methods are considered for analysis.

Here we are considering 4 scheduling algorithms such as Strict priority (SP), Self clocked fair(SCF),Round robin(RR) and Weighted fair(WF). Considering different parameter metrics such as Jitter , throughput, end to end delay and no. of unicast messages received we compare the performance of different scheduling algorithms.

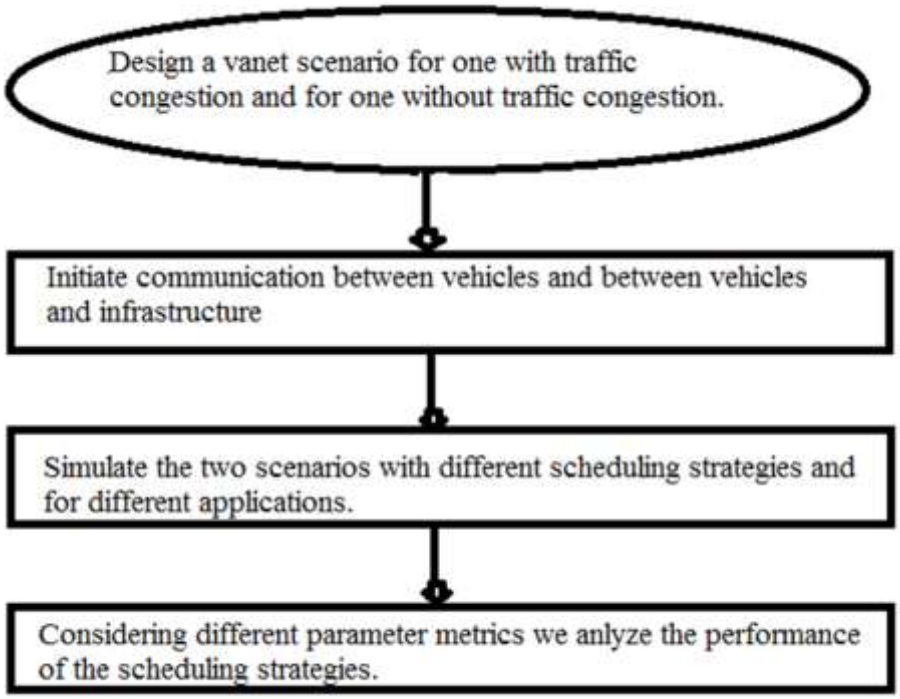


Fig.1 Flow Chart for analysis

IV. VANET SCENARIO

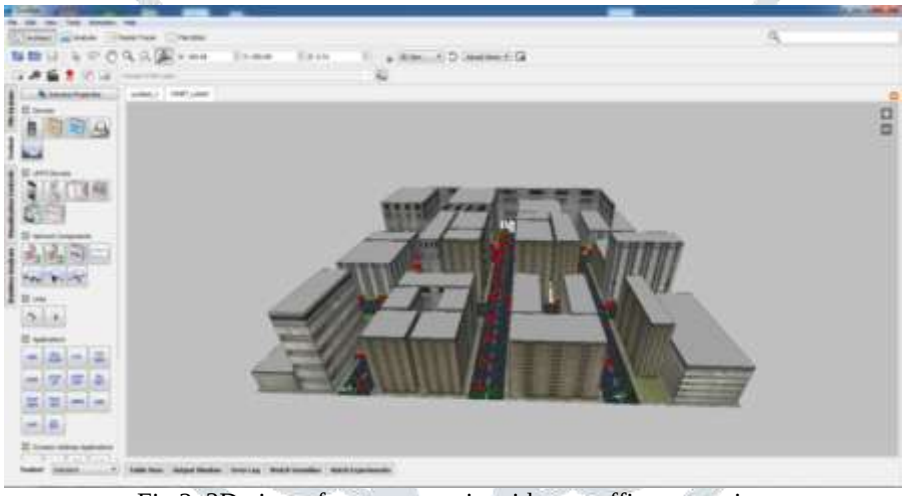


Fig 2. 3D view of vanet scenario without traffic congestion

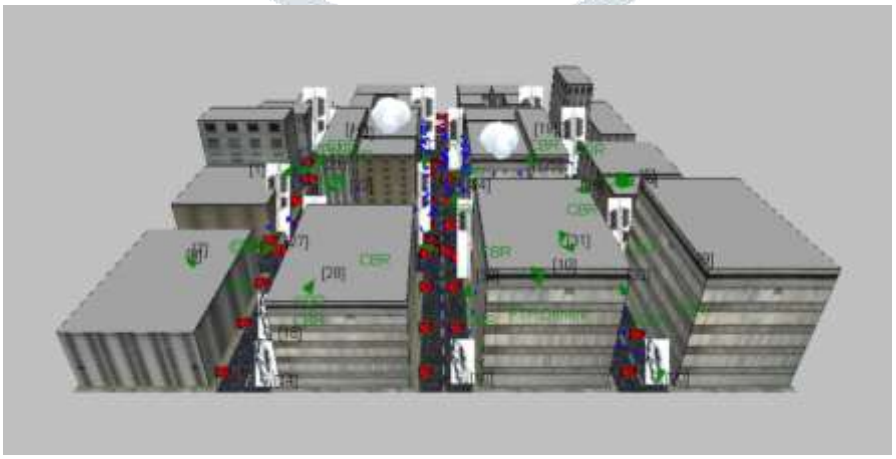


Fig 3. 3D view of vanet scenario with traffic congestion

We create the VANET scenario which defines an area fully covered by traffic signals installed with road side units(RSU's). The vehicles are equipped with wireless communication 802.11p.The channel properties determines the transmission range and coverage range of RSU's.

The vehicles are considered as nodes ,the communication can be of two types that can be between vehicle to vehicle(V to V) or vehicle to Infrastructure(V to I).

We place the nodes and devices on the scenario which generates the traffic as shown in fig.1 and we send the traffic between different nodes for different applications and we change the node level properties according to our requirement, then the network layer properties are changed according to the requirement of the scenario.

We simulate the scenario in Qualnet network and we are changing the network layer properties to simulate for different scheduling algorithms.

V. RESULTS AND DISCUSSION

The simulation parameters are as shown in the below table.

Parameter	Value
Physical Mac model	Physical Model: 802.11P ControlRadio 802.11P service Radio MAC Model: 802.11P
Terrain	1000*1000 sq.mt
Simulation time	1000 Sec
Propogation-Channel-frequency	2.4 Ghz
Traffic type	CBR,VBR
Antenna-Model	Omni directional
Antenna height(meters)	1.5
Antenna Efficiency	0.8
Path loss Model	Two Ray
Shadowing Model	Constant
Routing protocol	AODV
Number of Nodes	32 Nodes
Noise Factor	10.0
Temperature(K)	290.0
Network Protocol	IPV4
Mobility Model	File
Area consideration	Urban Environment

PARAMETER TABLE:

SIMULATION RESULTS:

Simulation results of VANET scenario without congestion

The VANET scenariowithout congestion is simulated for Total messages received,throughput,end to end delay and Average jitter.

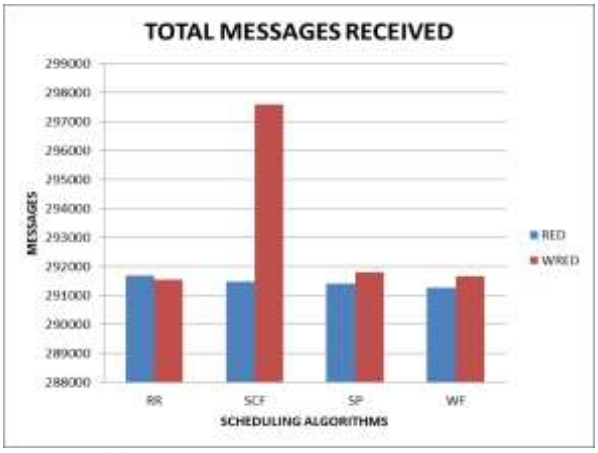
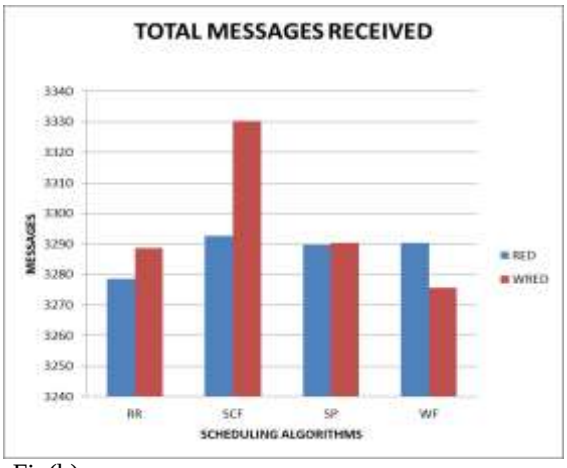
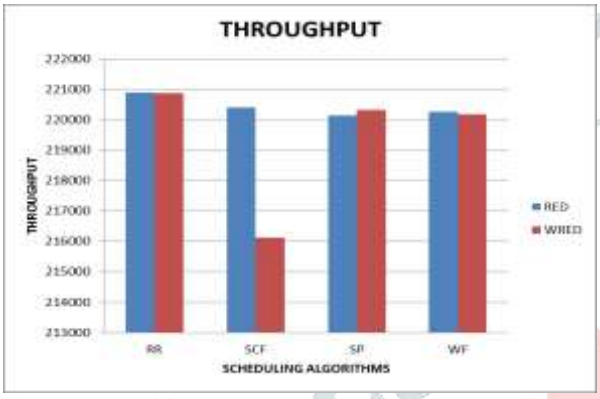


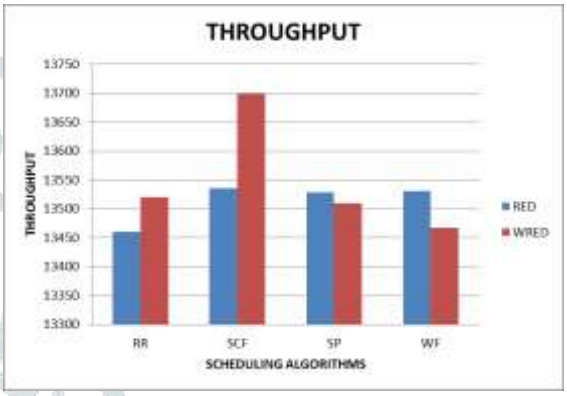
Fig (a)



Fig(b)



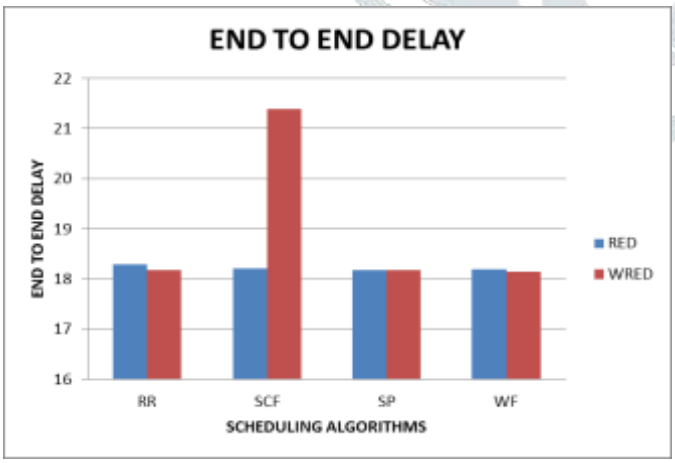
Fig(c)



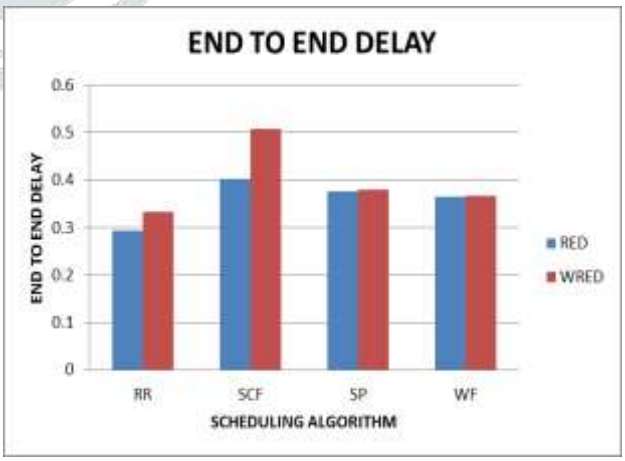
Fig(d)

Figure (a) and (b) represents the packet received for CBR and VBR applications respectively for VANET scenario without traffic congestion with a simulation time of 1000 seconds. . In comparison SCF WRED is the best scheduling algorithm which receive highest number of messages for both CBR and VBR application.

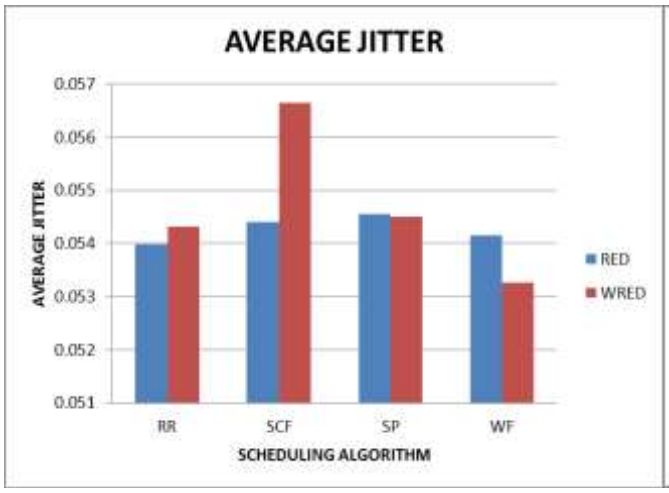
Figure (c) and (d) represents the throughput for CBR and VBR applications respectively. We know that throughput is the total number of packets successfully delivered over a communication channel. From the figure we can infer that RRRED has got the highest throughput for the CBR application and SCFWRED has the highest throughput for VBR application.



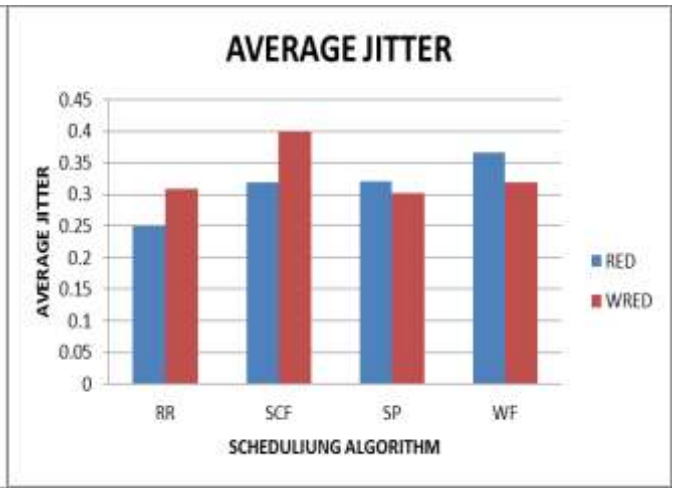
Fig(e)



Fig(f)



Fig(g)



Fig(h)

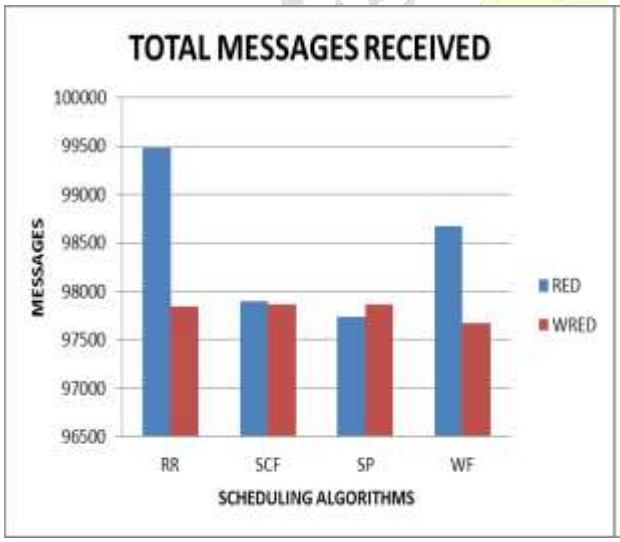
Figure (e) and (f) represents End to end delay for CBR and VBR applications respectively . End to end delay or one way delay refers to the time taken for a packet to be transmitted across a network from source to destination. Figure(e) and (f) represents WFRED and RRED has received the minimum delay.

Figure (g) and (h) represents average jitter for CBR and VBR applications respectively Jitter is defined as a variation in the delay of received packets. At the sending side, packets are sent in a continuous stream with the packets spaced evenly apart. Due to network congestion, improper queuing, or configuration errors , this steady stream becomes lumpy, or the delay between each packet can vary instead of remaining constant. Hence from the figure we get to know that WFRED and RRRED has got the minimum average jitter for CBR and VBR applications respectively.

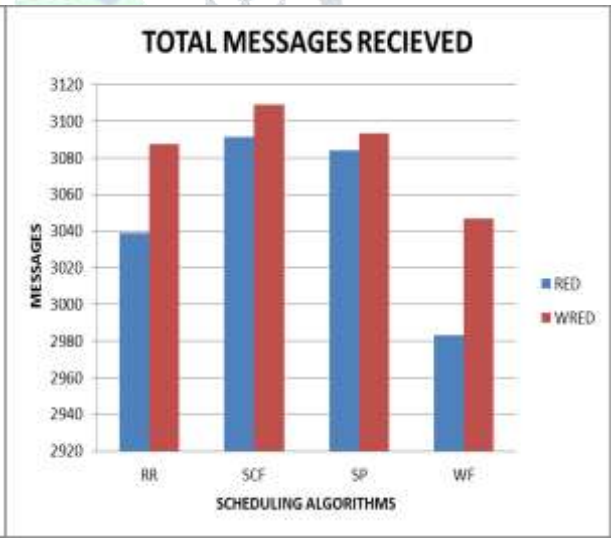
Simulation results of Vanet scenario with congestion

The below figure(i) and figure(j) shows the total messages received for CBR and VBR applications respectively for VANET scenario with congestion.From the figure we can decide that the total messages received is highest for RRRED for CBR application and SCFWRED for VBR application.

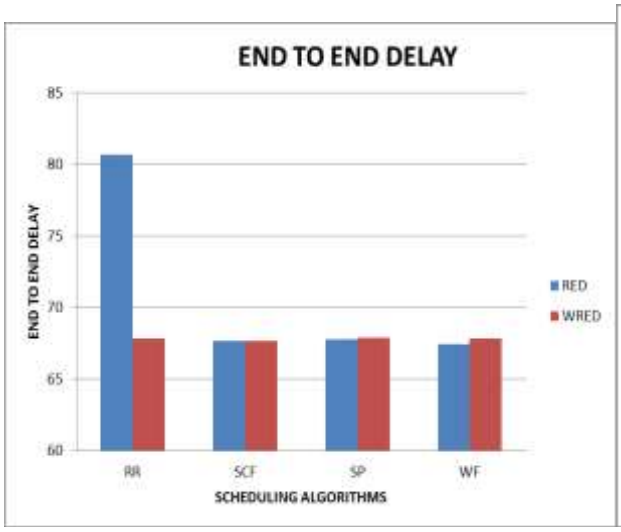
Figure (k) and figure (l) shows the end to end delay for different scheduling algorithms.from the figure it is evident that end to end delay is minimum for WFRED and SCFWRED for CBR and VBR applications respectively.



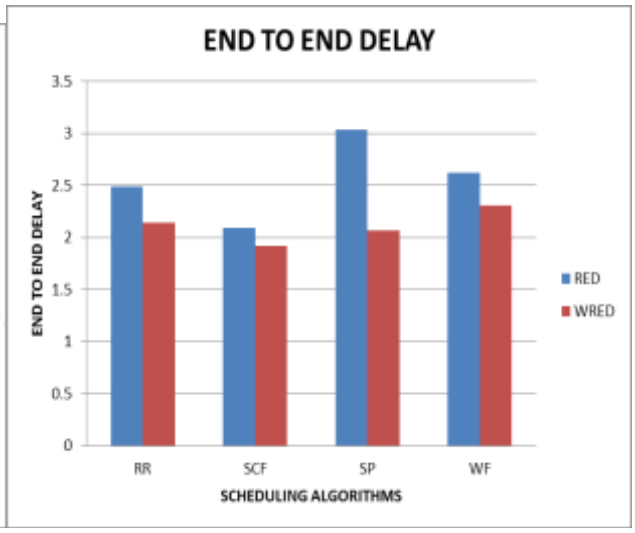
Fig(i)



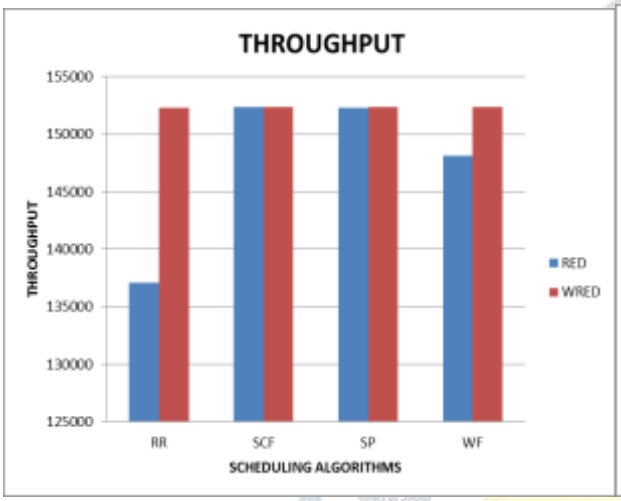
Fig(j)



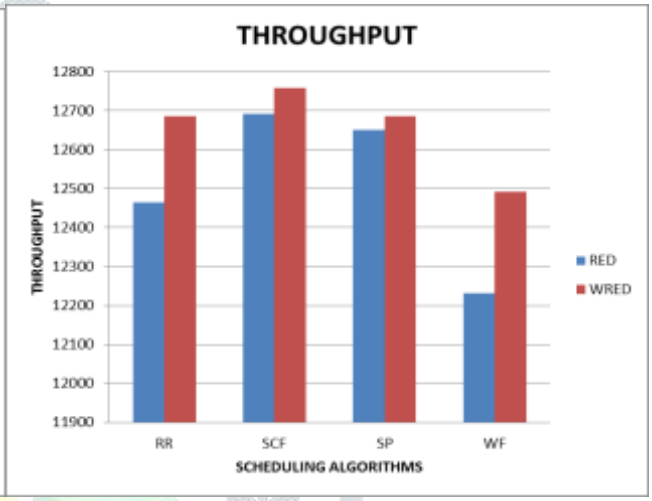
Fig(k)



Fig(l)



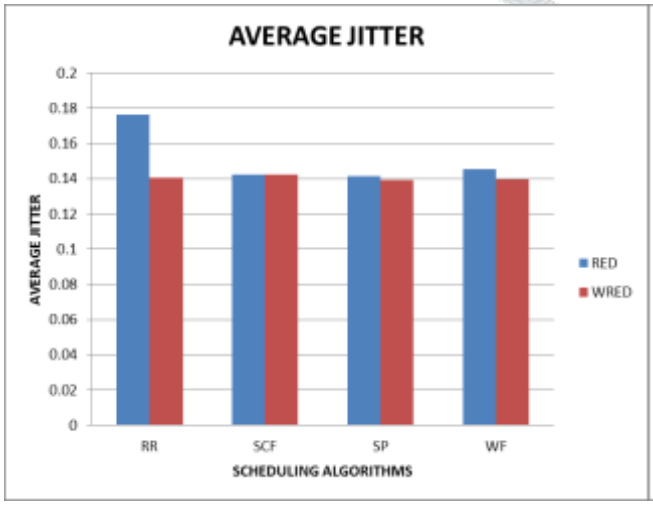
Fig(m)



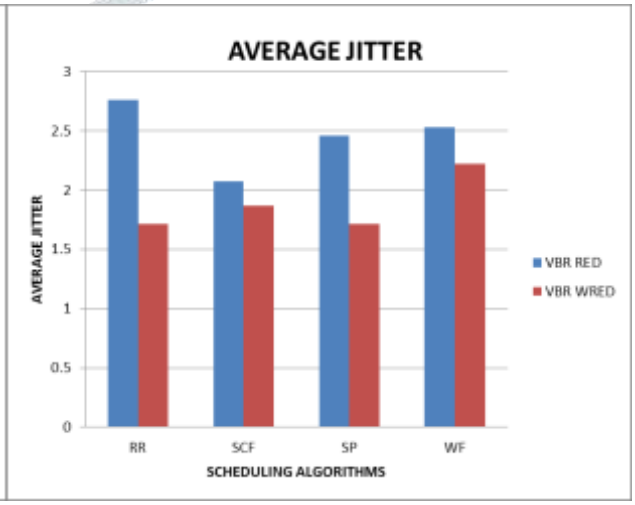
Fig(n)

Figure(m) and Figure(n) represents the throughput of CBR and VBR applications for different scheduling algorithms ,from the figure we can infer that SCFRED and SCRWRED has got the highest throughput respectively.

Figure(o) and Figure(p) represents the Average jitter of CBR and VBR applications for different scheduling algorithms ,from the figure we can infer that SPWRED has got the minimum average jitter for both applications.



Fig(o)



Fig(p)

V. CONCLUSION

Various scheduling algorithms are used in VANET .Scheduling techniques assure that the beneficiary received the desired message at the minimum time In this project we have analyzed the performance of the VANET network by considering four different scheduling algorithms and two queues for different applications. Here, we have taken the simulation results to analyse the performance of the VANET network for congestion based traffic scenario and non-congestion based traffic scenario. The performance of scheduling algorithms is

measured in terms of average jitter , end to end delay and throughput. Various factors affect the VANET data scheduling such as request valid time, request inter-arrival time, data access pattern, vehicle speed, work-load effect and the hotspot effect. By comparing these scheduling algorithms on the basis of various performance metrics we have reached to a conclusion that different scheduling algorithm gives the best results for different application, depending upon the type of application one can select the best scheduling algorithm as per needed on the basis of above analysis.

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