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Real Flow Dynamic Queue(RFDQ) performance evaluation with real flows in MANET

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Abstract
Due to its wireless and multi-hop routing constraints Mobile Ad-hoc NETworks (MANET) has limited resources due to which providing QoS constraints is a challenge to any flow within network. In this paper on one side we have studied the performance of real flows in basic priority queue environment of AODV while on other side real flows performance are evaluated with AODV added with "Real Flow Dynamic Queue (RFDQ)[1]".
Our result shows that RFDQ performance is better than priority queue on different parameters. RFDQ can be a replacement for priority queue as it works better for real flows or high priority flows by evaluating priorities in better way.

I. Introduction

MANET's are temporary networks, consist of mobile nodes with limited resources like bandwidth, battery life etc. It is de-centralized collections of nodes so it does not rely on any fixed infrastructure[2][3](blackhole).RFDQ is already examined in[1] for flooding attacks on MANET[4].This paper will evaluate the performance of RFDQ on MANET, with one or more than one real-flows on the network. While Real flows needs better Quality of Service than best-effort traffic.For this purpose AODV[5] is used for the evaluation purpose under two kinds of queue one is RFDQ while other is priority queue. A short description of RFDQ is given section 1.1

Various buffer management schemes are available to manage traffic and to offer better service to real-time data flows.We discuss here some of them like EERV[6] does reservation on end to end basis for any required flow. IntServ [7] and Differv [8] can be identified as fundamental QoS provisioning model but unfortunately both of them are not appropriate for MANET .IntServ is not scalabile while DiffServ classified traffic using boundary nodes, while as per nature of MANET their cannot be any such nodes.

Urgency-specific Packet Scheduling And Routing Algorithms[9] will transmit urgent data without any delay. Real traffic Queue model such as [10], uses application types and Time To Live(TTL) to manage priority, For real Packets Scheduling in MANET Priority embedding is assigned to multi-class packets[11].

In our paper we had presented

1.1 Introduction to RFDQ

RFDQ procedure is referred from [1] and can be summarize as follows.

RFDQ provides high priority to data packets which belongs to real flows set(RF). The main idea is if queue is filled than real flow packet is dropped only in rarest case. Here it is considered that transport mark flow id with unique code like "999" using it any node's buffer can understand packet type.(using αP_i)

Terms used in RFDQ are as follows:

$\alpha P_{i:}$ Header of packets

P_i : Packet receive by RFDQ

$\neg RP_{i:}$ Pi is not routing packet but data packet

$FP_{i:}$ Flow id of packet received

αMax: Maximum size of queue

The RFDQ process can be explained as:

a. Whenever any packet that belongs to RF set is received, it is placed at the top i.e *bufferHead(Pi)*
b. After inserting it at top RFDQ checks if queue size>max limit,if its true then it lookup the buffer for a pkt does not belong to RF set. If no such pkt is available then it will drop the last pkt else step 'c' is executed
   If(buffer>= αMax){

bufferHead(Pi): set packet to the head

For each buffer(k) where k =0 to βlength

If (Pk ϵ RF set){ Flag=1; quit loop} End for

If(flag==0){:all packet in buffer are ϵ RF
//drop the last packet in queue
Drop: buffer(βlength)
}

a. It will take care to drop the non-real pkt which are recently arrived, by look-up queue in reverse order and droping the first pkt that does not belong to RF set. The process will be terminated, upon receiving next pkt go to step (a)

For each buffer(l) where l= βlength to 1
P_c*=buffer(l)*
If $P_c \notin$ *RF set*
Drop:P_C *i.e is not a pkt from real flow*

2.1 Simulation setup:

2 Performance Comparisons of RFDQ with priority queue under Real Flows

For evaluation we purpose various numbers of real flows {1,3,5} are used
Performance Consideration Bases:

a. Packet Delivery Fraction (PDF): PDF in RFDQ is Vs. priority queue
b. Average Delay: average Delay of Relay packets in RFDQ is compared with delay in priority queue
c. Number of Packet Drop: Real packet dropped using RFDQ is compared with priority queue environment

Table1. Simulation setup for various evaluations (NS2 is used for simulation environment.)

Simulation Parameter	Value
Simulation time	100s
No. of nodes	50
Area	500x500 m
Traffic	CBR
CBR Rate	0.12
Motion	Random
Routing protocol	AODV
No. of Real Flows	1,3,5
Transport Layer	UDP
Node max. speed	10 m/s
Max. Connection	40
Pause time	2

2.2 Simulation Results

a) Packet Delivery Fraction (PDF): PDF in RFDQ is Vs. priority queue
Fig 1 shows how RFDQ is better from priority queue, packet delivery ratio is better in RFDQ in one, two or three numbers of real flow environents.

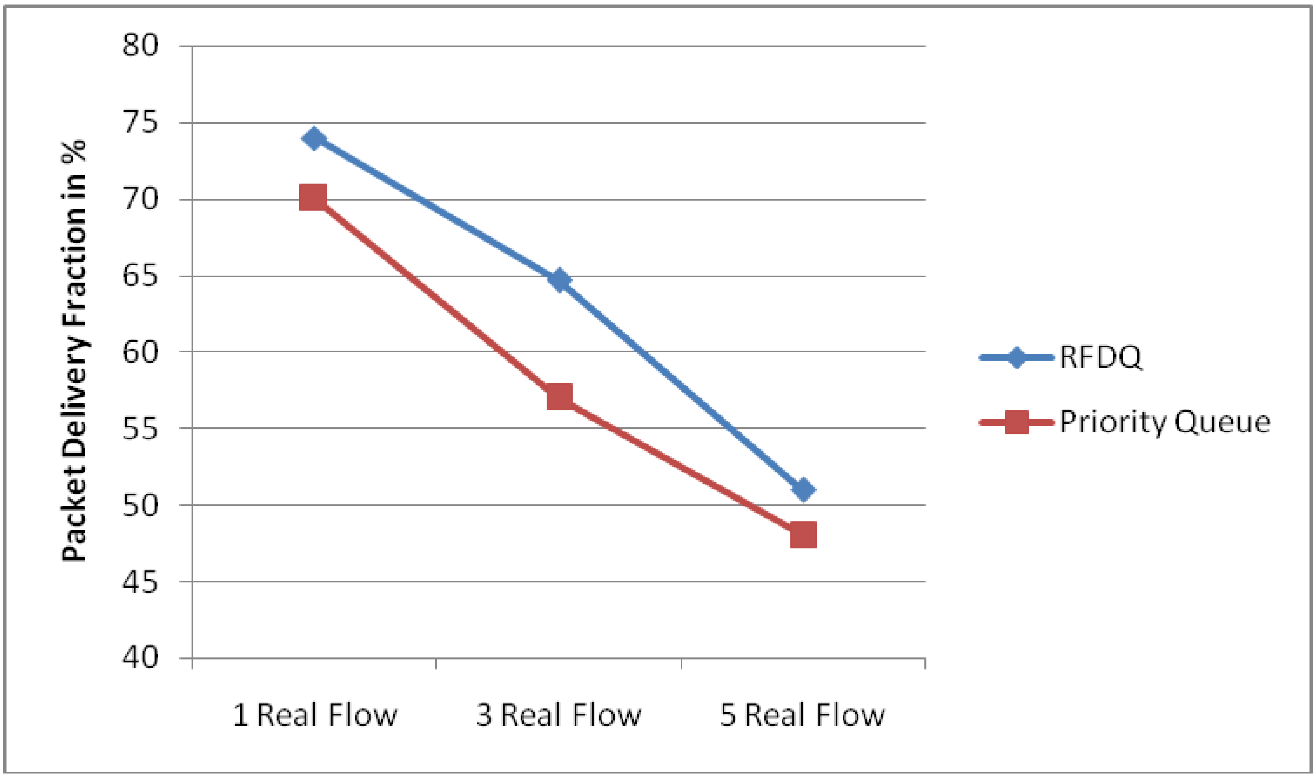

Fig.1 : PDF in RFDQ is Vs. priority queue

a) Average Delay: average Delay of Relay packets in RFDQ is compared with delay in priority queue
Fig.2 show RFDQ takes less time to deliver real packet from source to destination while priority queue takes more time this is because RFDQ gave high priority to real packets

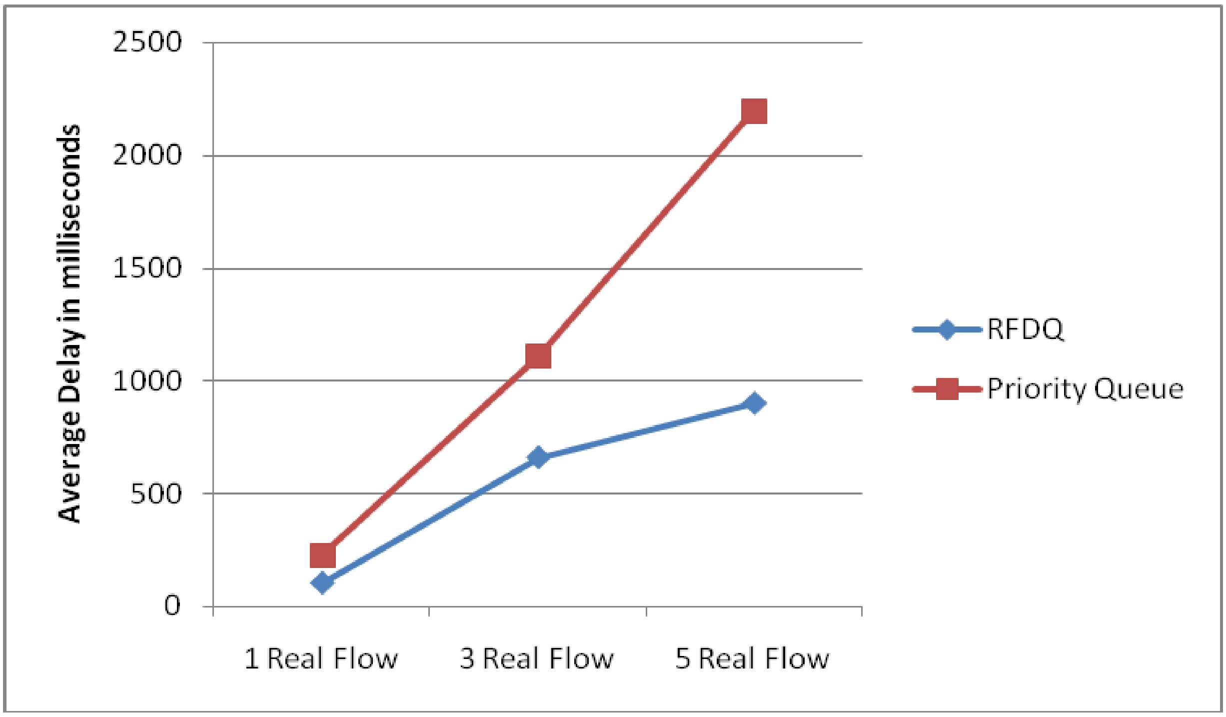

Fig.2 Average delay of Real packets in RFDQ Vs. priority queue

b) Number of Packet Drop: Real packet dropped using RFDQ is compared with priority queue environment
AS RFDQ takes care to drop the real packet in only very rarest case, that's why packet drop in RFDQ is much lesser in RFDQ comparing to priority queue.

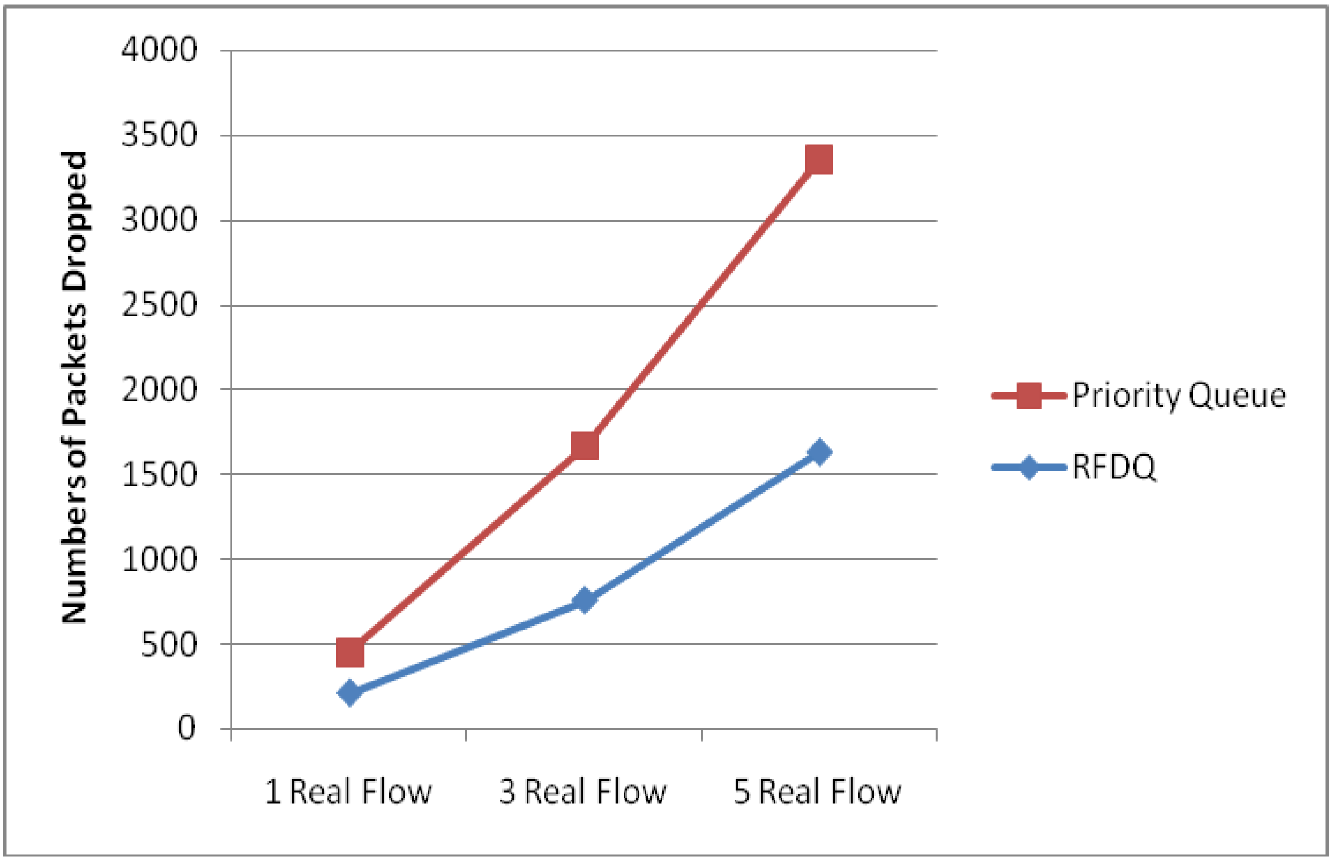

Fig3. Real packet dropped using RFDQ Vs. priority queue environment

Conclusion

We have evaluated RFDQ with different numbers of real flows in network, as RFDQ keeps high priority for real time packets and also it rarely drop the real packet even the queue is maximum filled, these two property makes it better then priority queue as evaluated for packet delivery fraction, average delay and packet drop. In future we will implement RFDQ with other routing protocol like DSR etc.

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