

Queueing for Multisource Network- “ Type of Queue Decides Quality of Services of Network”

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Abstract: In the field of communication safe and reliable transmission of data is extremely important issue. Emergence of computer networks and Internet brings a tremendous change in the field of communication. A computer network forms, when we interconnect two or more computer system over a same link for the sharing of resources. Wired Computer network is highly recommended because they are flexible and multi-adaptive in nature. In wired network various queues has been used out for the safe and reliable transmission of data. Thus, the implementation and proper selection of the queues is one of the most important issues. The selection of the various queues is totally depends upon the need of transmission of data. In this paper, we evaluate the performance of Drop tail, DRR, RED, SFQ, and FQ by varying the number of source. We are representing the detailed performance analysis & comparison of the various queues in terms of parameters like throughput, average delay and packet loss. These queues have been analyzed on various traffics like FTP and CBR, by varying the number of source and the various conclusions have been drawn accordingly.

Keywords: CBR, FTP, LINUX, NS2, Queue.

1. Introduction

The intercommunication between the various units is one of the basic and most important requirements of an organization. There are substantial amount of systems and networking devices are available in an organization. Now, there is a need to establish a reliable and secured intercommunication between various units. The implementation of the computer network allowed the user to access the remote system login facilities for accession of the remote database entry. They are responsible to establish the fast and reliable sharing of resources. There are various connection wizards those have been available for establishing the interconnection between the various computers.

2. Concepts of Queues

The transmission of packet over a medium at any instance of time requires a packet processing routine. Thus, to maintain a proper processing of the packets over a source an interface must be deployed. This interface object must be able to accept the request from source objects to transmit a packet, even when the medium is busy in transmitting a previous packet. The various queues, which were implemented, can be discussed into the following categories .

- Drop Tail Queue
- Random Early Detection (RED Queue)
- Stochastic Fair Queuing
- Deficit Round Robin (DRR)
- Fair Queue (FQ)

3. NS2 Simulation Environment

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The simulator is a tool for demonstrating the various protocols, algorithms and to serve as an aid in the better understanding of the protocols. In this paper the, simulation of the various network topologies is done by using the NS2. The NS2 is an object oriented discrete event simulator. In a discrete event simulator, various events occur at an instant of time, which makes the change in the state of targeted system. Various routing, multicast and TCP protocol over the wired and wireless network are substantially supported by the NS 2.

3.1. Simulation Environment and Parameters

The version NS2.33 has been used out for the simulation study and analysis. The various simulation parameters are specified in the Table.

TABLE 1 SPECIFICATIONS USED FOR SIMULATION MODEL

Parameter	Setting
*Channel Type	Wired Channel.
*Queue Type.	Drop Tail/DRR/RED/SFQ/FQ
*Maximum Packet in Queue.	10
*Number of Source.	Varied from 2 to 6

3.2. Comparison Metrics

The throughput, average delay and packet-loss are the three quantitative metrics used to compare. In the next sections, we define those three quantitative metrics.

3.2.1 Throughput

The Throughput is defined as number of bits received by the destination per second. This is an important metric in networks.

$$*Throughput (kbps) = (Total_data_received / Simulation_time) \times (8/1000)$$

TABLE 2 THE COMPARISON BETWEEN THROUGHPUTS OF DIFFERENT QUEUES, WHEN NO. OF SOURCES IS VARIED

No. of Source	Drop Tail		RED		SFQ		DRR		FQ	
	FTP	CBR	FTP	CBR	FTP	CBR	FTP	CBR	FTP	CBR
2	1427.15	1483.94	1154.52	1476.72	1396.86	1501.99	1384.8	1512.82	1436.23	1547.6
3	1340.71	1504.21	1296.08	1497.73	1535.34	1522.04	1524.33	1530.14	1557.21	1566.36
4	1501.33	1520.72	1313.157	1514.84	1532.27	1536.9	1551.8	1544.26	1561.54	1577.03
5	1436.9	1535.78	1419.81	1530.4	1570.4	1549.24	1569.37	1557.32	1560.18	1582.76
6	1456.37	1582.92	1438.67	1582.59	1576	1583.82	1570.05	1584.22	1575.56	1586.18

Figure 2: The graph of Throughput Vs Number of Transmitting Source of CBR

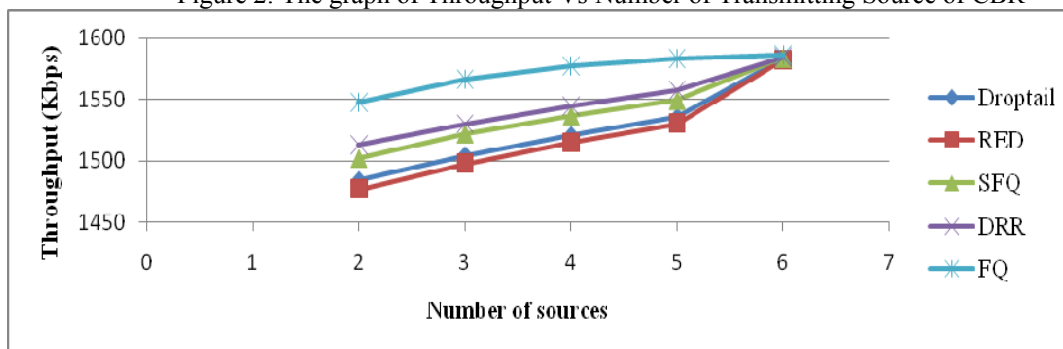


Figure 2 & 3 shows the variation of the concerned metric i.e. Throughput v/s. the variable parameter Transmitting Source for the two traffic FTP & CBR for all queues. Now as the data transmission from source increases the data rate also increases, which causes the significant increase in the Throughput. But as packet loss & delay increases due to busy traffic at the queue the throughput per source decreases. Here FQ provides maximum throughput in CBR and FTP traffic, while RED is providing minimum throughput for both traffic CBR and FTP.

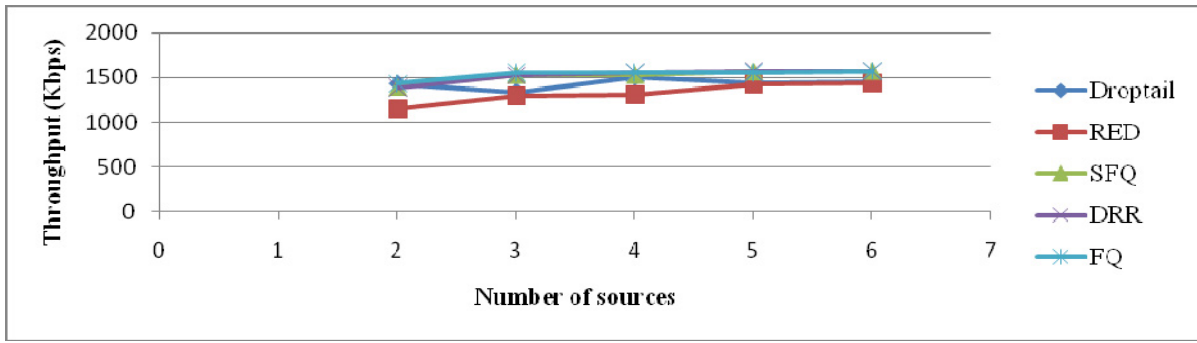


Figure 3: The graph Throughput Vs Number of Transmitting Source of FTP

TABLE 3 PERCENTAGE CHANGE IN THROUGHPUT PER SOURCE FOR ALL QUEUES, WHEN NUMBERS OF SOURCES ARE VARIED

Queue	Droptail		RED		SFQ		DRR		FQ	
	CBR	FTP	CBR	FTP	CBR	FTP	CBR	FTP	CBR	FTP
Percentage change(Decrease)	65.9	64.5	58.7	64.36	62.13	62.69	62.3	65.07	63.5	65.84

3.2.2 Average End-to-End Delay

The end-to-end delay includes all possible delays in the network caused by route discovery latency, retransmission by the intermediate source, processing delay, queuing delay, and propagation delay.

$$*Average_End_to_End_Delay = \Sigma (Time_recvd - Time_sent) / Total_Data_packets_recvd$$

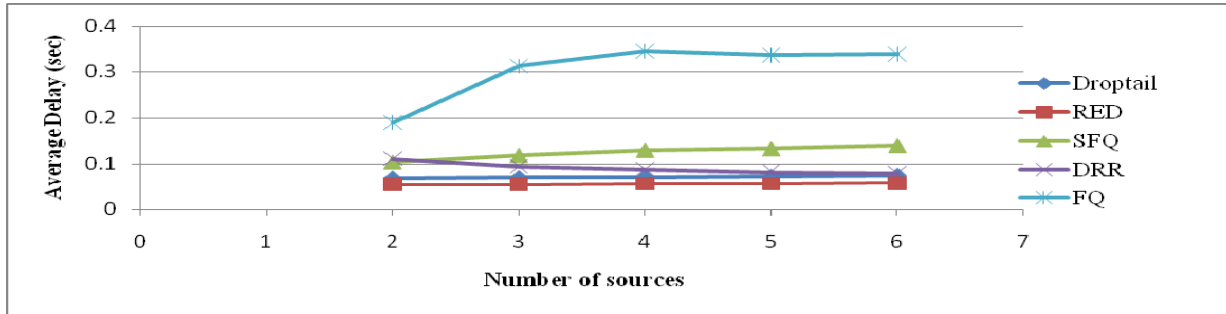


Figure 4: The graph of Average Delay Vs Number of Transmitting Source of CBR

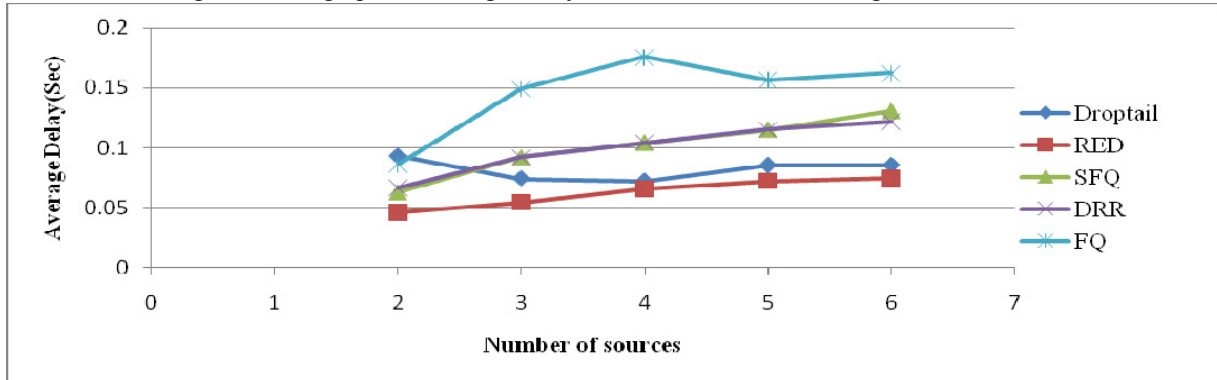


Figure 5: The graph of Average Delay Vs Number of Transmitting Source of FTP

TABLE 4 COMPARISON BETWEEN DELAYS OF DIFFERENT QUEUES, WHEN NUMBERS OF SOURCE ARE VARIED

No. of Source	Drop Tail		RED		SFQ		DRR		FQ	
	FTP	CBR	FTP	CBR	FTP	CBR	FTP	CBR	FTP	CBR
2	0.0934	0.0461	0.0631	0.0667	0.0859	0.0693	0.0553	0.1043	0.1108	0.1894
3	0.0745	0.0546	0.0922	0.0920	0.1490	0.0704	0.0558	0.1185	0.0949	0.3125
4	0.0724	0.0658	0.1045	0.1043	0.1756	0.0720	0.0564	0.1298	0.0877	0.3449
5	0.0855	0.0723	0.1152	0.1151	0.1565	0.0727	0.0568	0.1326	0.0833	0.3357
6	0.0857	0.0747	0.1308	0.1217	0.1621	0.0748	0.0580	0.1395	0.0803	0.3386

The above Figure 4 & 5 shows the variation of the concerned metrics namely Average Delay with respect to the variable parameter number of sources of two traffics CBR & FTP. By increasing the source of the transmission the Average End to End Delay is increases due to long wait time for the transmission as buffer

is full. So packets spend more time in the buffer thus increase in Delay. In this case FQ has maximum delay in both type of sources CBR and FTP.

3.2.3 Packet loss

The packet loss is defined, as the difference of data packet send by all sources and the number of received data packets at the destination source. The bigger this fraction is the less efficient the protocol.

$$*Packet\ loss = Total_packets_sent - Total_Data_packets_recvd$$

TABLE 5 THE COMPARISON BETWEEN PACKET LOSSES OF DIFFERENT QUEUES, WHEN NUMBER OF SOURCE IS VARIED

No. of sources	Drop Tail		RED		SFQ		DRR		FQ	
	FTP	CBR	FTP	CBR	FTP	CBR	FTP	CBR	FTP	CBR
2	9	104	22	108	8	94	4	88	0	63
3	21	436	33	440	30	425	18	420	0	354
4	28	893	39	897	53	882	30	877	3	811
5	41	1349	48	1353	70	1339	44	1333	7	1308
6	61	1806	67	1810	95	1795	54	1790	9	1765

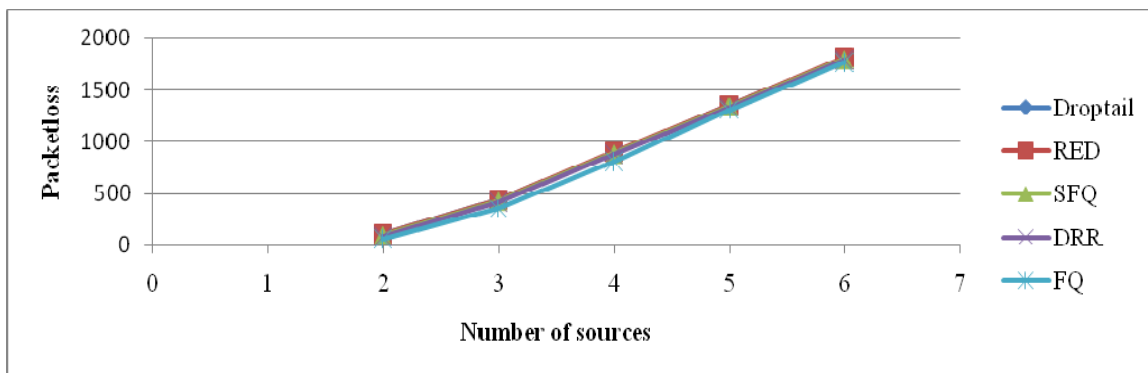


Figure 6: The graph of Packet losses Vs Number of Transmitting Source of CBR

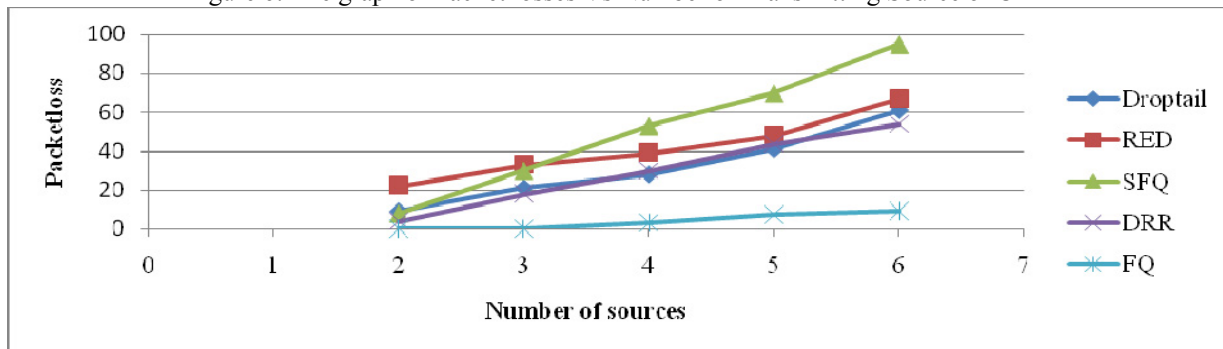


Figure 7: The graph of Packet losses Vs Number of Transmitting Source for FTP

The above figure no. 6 & 7 shows the variation of the concerned metrics i.e. Packet loss with respect to the variable parameter Transmitting Source for the two traffics FTP & CBR. Now by increasing the Transmitting source the Packet loss increases because on increasing the number of source more packets arrived at a time and this result in buffer saturation and causes Packet loss. The RED shows maximum number of packet loss in case of CBR traffic while SFQ shows maximum number of packet loss in case of FTP. The FQ shows minimum number of packet loss in CBR and FTP traffic.

4. Conclusions and Future Work

Now, by taking all the figures and tables into consideration, we can be able to conclude that the performance of the queue is mostly affected by the increment in number of source. Various parameters like Average Delay, Throughput and Packet loss are directly or indirectly affected by the variation in number of source. During the implementation period each of the queues has been studied for different cases. In some cases, some queues perform well, while other queues have some drawbacks. By increasing number of sources, due to increase in traffic, each queue is showing more packet loss because of its respective properties. Throughput will be increased, as incoming data rate increases. But throughput per source is decreases as packet drop & delay increases due to busy traffic at the queue. The FQ performs quite

predictably; it delivers all the data packets, with the increment in no. of source. The other queues like Drop Tail, RED, SFQ and DRR, shows the random behavior during the increment in number of source. Thus, they are not unpredictable in nature. As the number of sources increases different Parameters, shows increment or decrement in their respective values. On increasing the numbers of source, Average Delay and Packet Loss increases while Throughput per source get decreases. Each increment in number of source increases simulation time, so packet has to spend more time in buffer before delivery which is responsible for the decrement in throughput and increment in delay, while more collision cause increment in Packet Loss. In the future prospective, we are working to extend our work over the performance assessment of queues in wireless & satellite network. By implementing complex topologies in different scenarios the performance evaluation of traffic types like VBR can be drawn out.

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