CS-342 NETWORKS ASSIGNMENT-4

Group 14

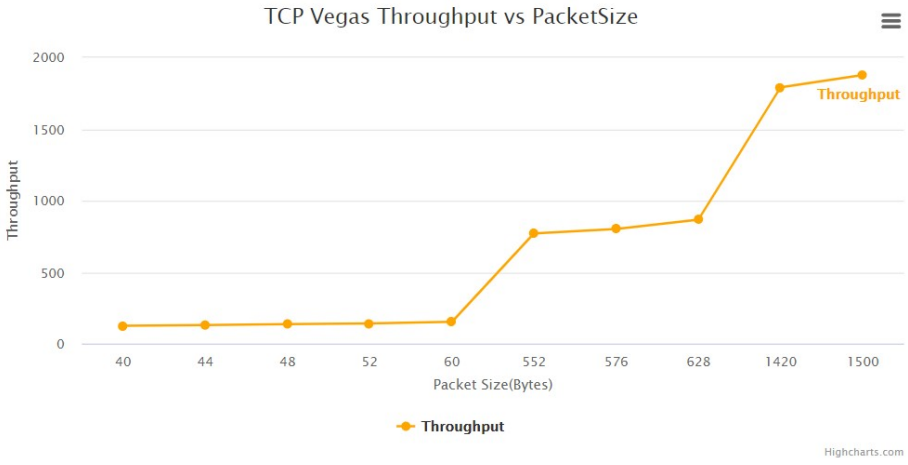
WIRED CONNECTION

Conclusions from the graphs

- It was observed that TCP Vegas has less throughput in comparison to TCP Westwood and TCP Veno. Also, it is observed that Veno and Westwood have almost same throughput for all the packet sizes.
- In TCP Vegas generally throughput increases with increase in packet size whereas in Westwood and Veno throughput first increases upto a certain packet size and then it drops after reaching a peak. Then the throughput again increases slowly.
- For all cases, we got the value of Fairness Index to be 1.

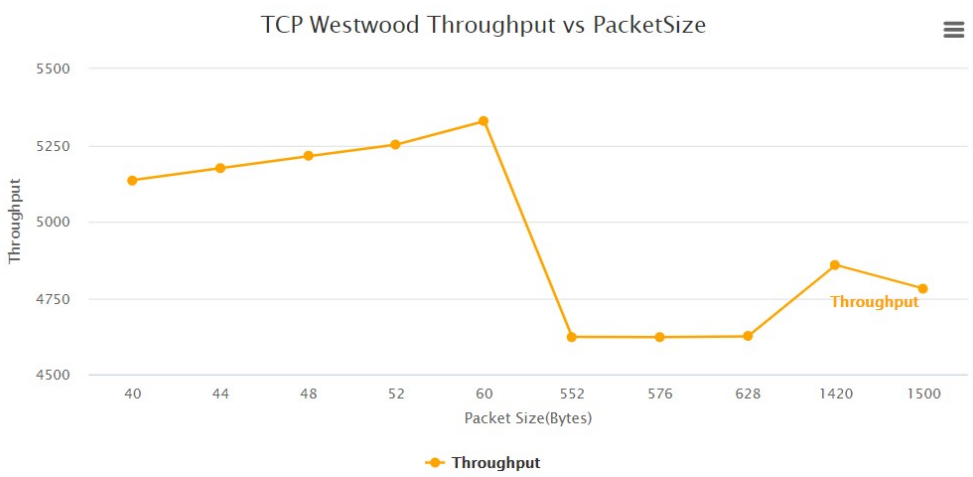
TCP VEGAS

Size of Packet	Throughput	Jain's Fairness Index
40	125.308	1
44	130.74	1
48	136.173	1
52	141.605	1
60	152.466	1
552	771.27	1
576	801.637	1
628	867.362	1
1420	1792.58	1
1500	1877.85	1



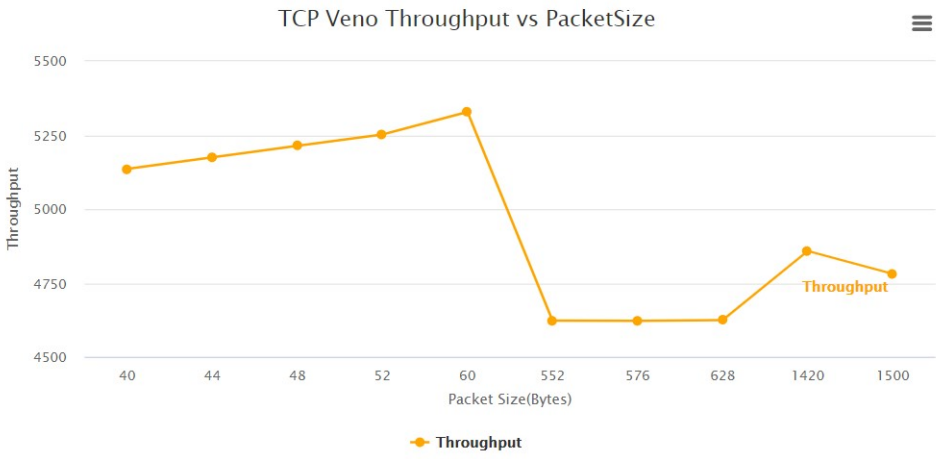
TCP WESTWOOD

Size of Packet	Throughput	Jain's Fairness Index
40	5135.59	1
44	5174.7	1
48	5213.5	1
52	5252.01	1
60	5328.41	1
552	4622.79	1
576	4621.67	1
628	4624.46	1
1420	4858.04	1
1500	4780.92	1



TCP VENO

Size of Packet	Throughput	Jain's Fairness Index
40	5135.59	1
44	5174.7	1
48	5213.5	1
52	5252.01	1
60	5328.41	1
552	4622.79	1
576	4621.67	1
628	4624.46	1
1420	4858.04	1
1500	4780.92	1



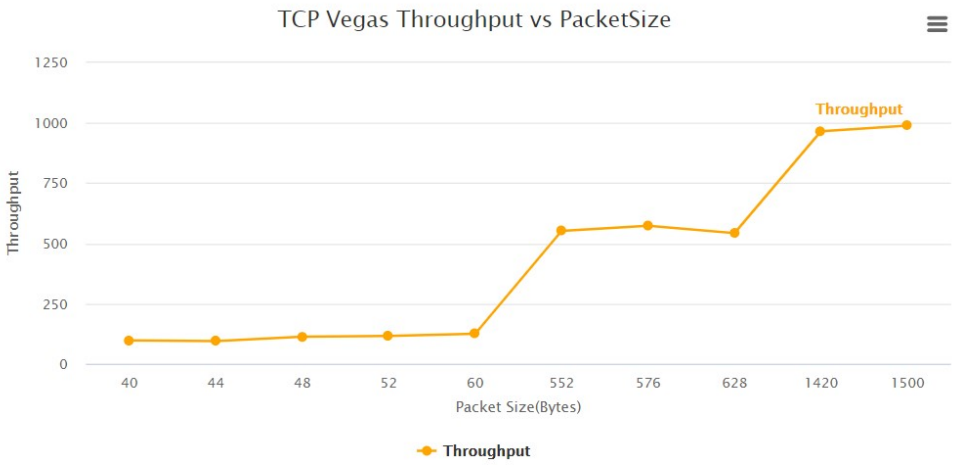
WIRELESS CONNECTION

Conclusions from the graphs

- For wireless throughput increases with increase in packet size for all the three TCP agents.
- We can also observe that throughput is lower for all the agents in the wireless case in comparison to the wired connection.
- We also observe that Fairness index is one in all cases.
- We can also observe that TCP Vegas has slightly lower throughput for some packet sizes in comparison to TCP Westwood and TCP Vegas.

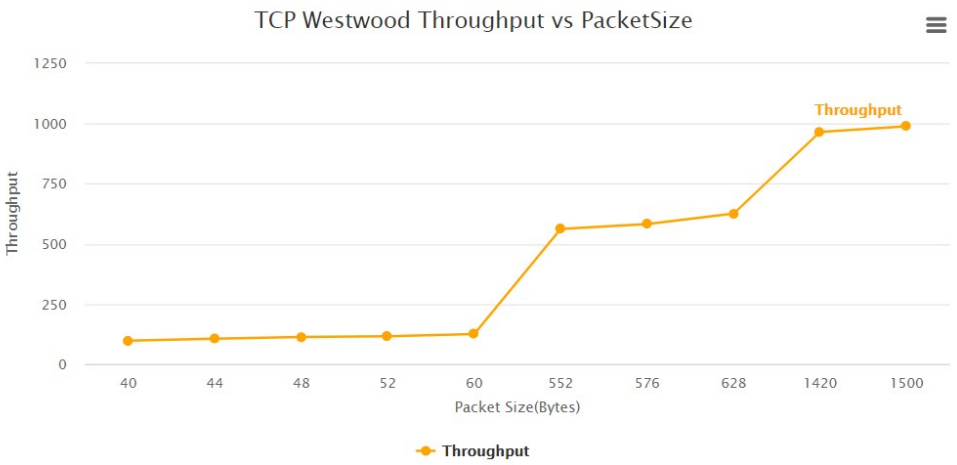
TCP VEGAS

Size of Packet	Throughput	Jain's Fairness Index
40	97.1831	1
44	94.6314	1
48	113.299	1
52	115.827	1
60	124.9	1
552	551.996	1
576	572.953	1
628	543.131	1
1420	965.875	1
1500	988.49	1



TCP WESTWOOD

Size of Packet	Throughput	Jain's Fairness Index
40	97.1831	1
44	106.011	1
48	113.299	1
52	115.827	1
60	124.9	1
552	561.673	1
576	581.995	1
628	625.827	1
1420	965.875	1
1500	988.49	1



TCP VENO

Size of Packet	Throughput	Jain's Fairness Index
40	97.1831	1
44	106.011	1
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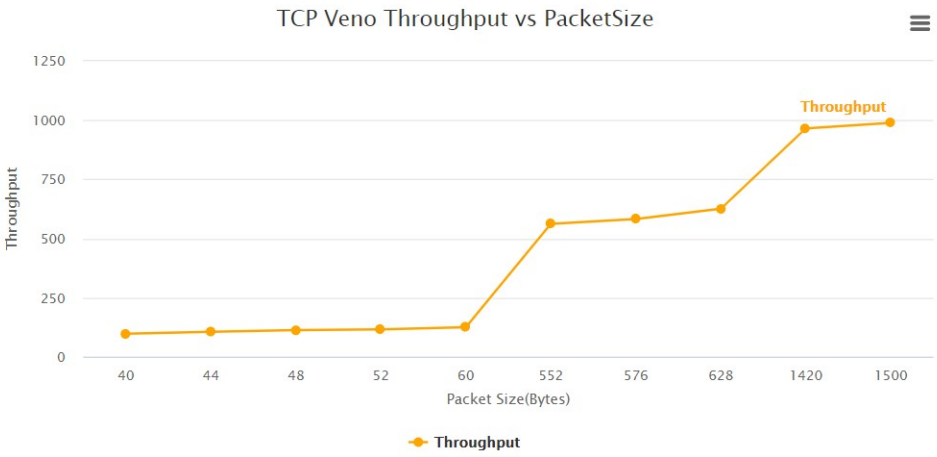

After receiving the first duplicate ACK, TCP Vegas will retransmit the packet assuming it to be lost in the medium. As compared to other TCP agents it won't wait for three duplicate ACKs so it results in lower utilization of the channel by frequent retransmission of packets which significantly decreases the throughput.

JAIN'S FAIRNESS INDEX

We notice that in all the above cases (wired and wireless) for all agents, we have only one network connection. Thus, the value of Jain's Fairness Index is equal to 1.

$$\mathcal{J}(x_1, x_2, \ldots, x_n) = \frac{(\sum_{i=1}^{n} x_i)^2}{n \cdot \sum_{i=1}^{n} {x_i}^2}$$

In the above formula X_i represents the throughput of the i^{th} connection. Here is the plot of the same.