EECE5698: Wireless Multimedia Sensor Networks

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Homework 1

Due: March 6, 2016

(a)

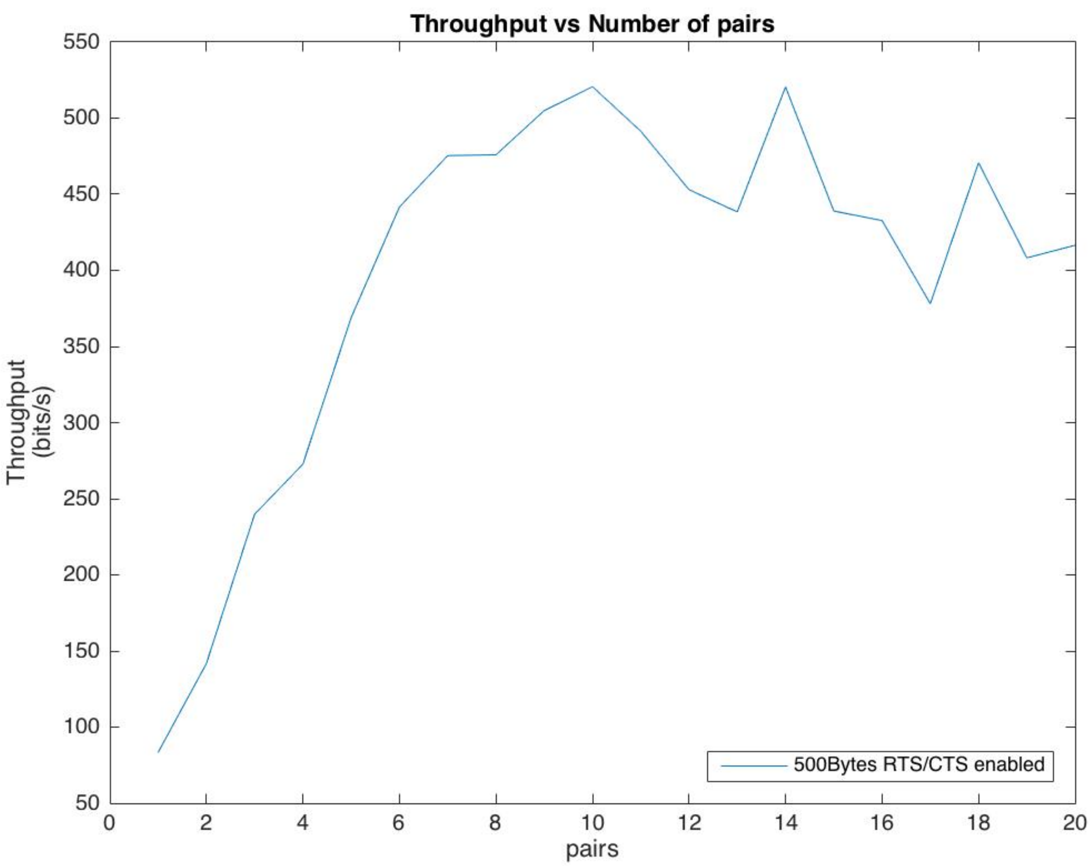

figure 1.1

From the figure 1.1, we can see that throughput increases as the pairs of nodes increases when n <= 10, while it goes the other way when n > 10. And to be specific, when n < 6, it goes up linearly since the traffic is light and the throughput of the network is dominated by the numbers of nodes which are transmitting. When n is between 6 and 10, it goes up like a log function as the traffic increases and loss of packet starts to happen. The throughput of the network still increases though with a lower rate. When n = 10, it reaches a peak point, where the effect of increase of pairs is neutralized by the effect of packet loss. After the peak point, the throughput of the network is dominated by the effect of packet loss caused by collision. It goes down in general as the increment of the numbers of pairs. Since collisions are randomly happened and we only do 10 times of simulation, we cannot get a very accurate curve. The curve goes down with vibration.

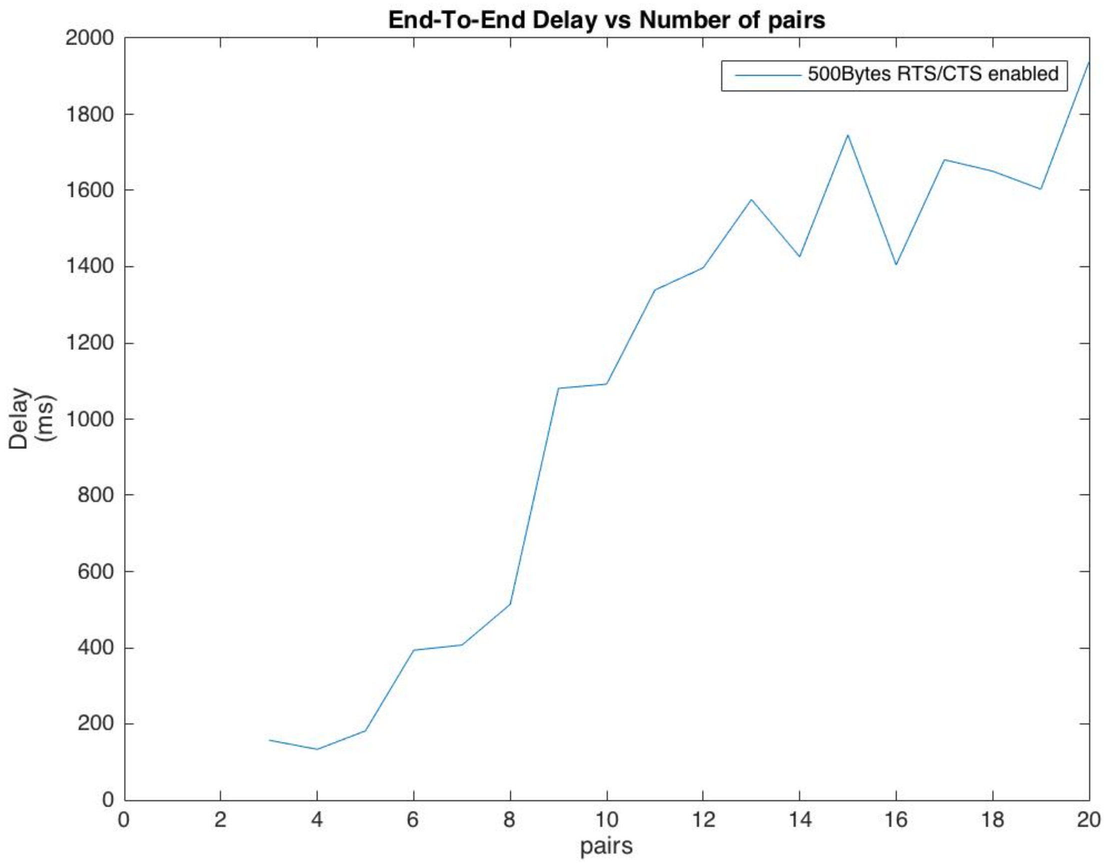

figure 1.2

From Figure 2.2, we can see that the End-To-End delay of the network goes up generally. Noticed that it goes up slowly when n is smaller than 6, where the traffic load is light. After that it goes up significantly as the traffic load increase. When n > 10, the rate of increment is decreased. This is because we do not have the retransmission after collision and the delay is calculated without the delay of lost packet. So the rate is decreased somehow. And also the curve is not accurate since we only run 10 times simulation.

(b)

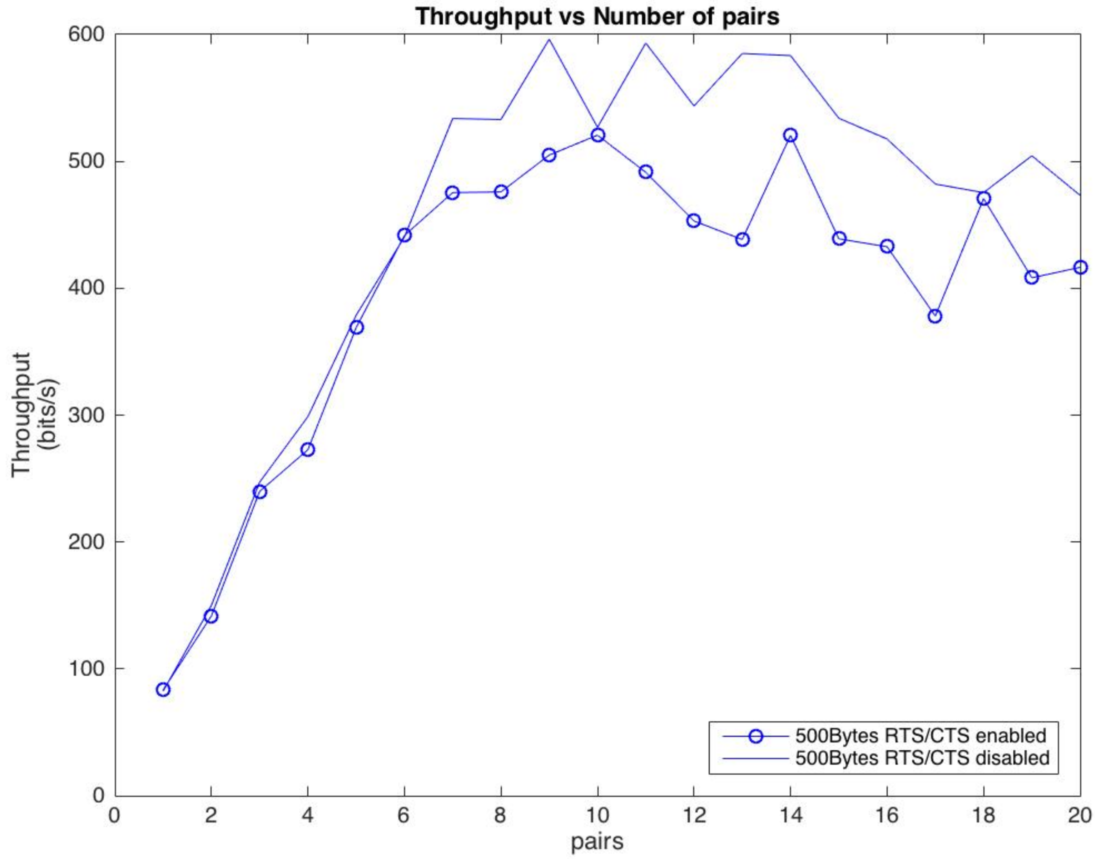

Figure 2.1

Figure 2.1 shows the comparison of throughput between RTS/CTS enabled network and RTS/CTS disabled network. The trend of curves are similar. Both of them go up at first and then get saturated, finally go down. The reason of this trend is the same as (a). However, RTS/CTS enabled has a lower throughput than RTS/CTS disabled when the traffic increases when n > 6. This is because before saturation happens, RTS/CTS enabled network has more packets(RTS/CTS) to send, which leads to a heavier traffic load. When 6 < n < 10, the number of pairs dominates the throughput instead of collision. So RTS/CTS has a negative effect during this period. When n > 10, the collision starts to dominate the throughput which leads to a decrease. The difference between two curves become smaller because RTS/CTS reduces transmitted packets' collision compared to RTS/CTS disabled curve.

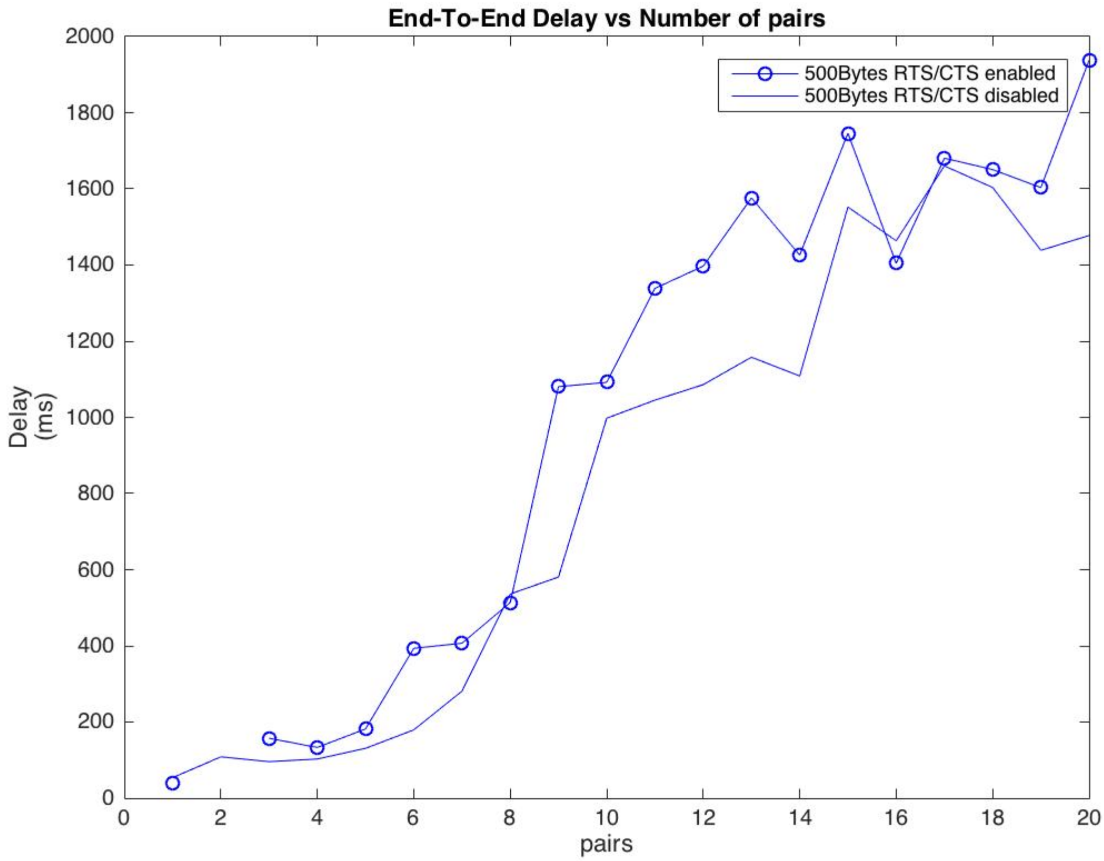

Figure 2.2

The End-To-End delay of RTS/CTS enabled is higher than RTS/CTS disabled since the enabled one has a lighter traffic load. As the number of pairs grows, the difference between two curves reaches a peak point and then gets smaller since RTS/CTS starts to perform well.
And still, the curves are not very accurate because the times of simulation is not enough.

(c)

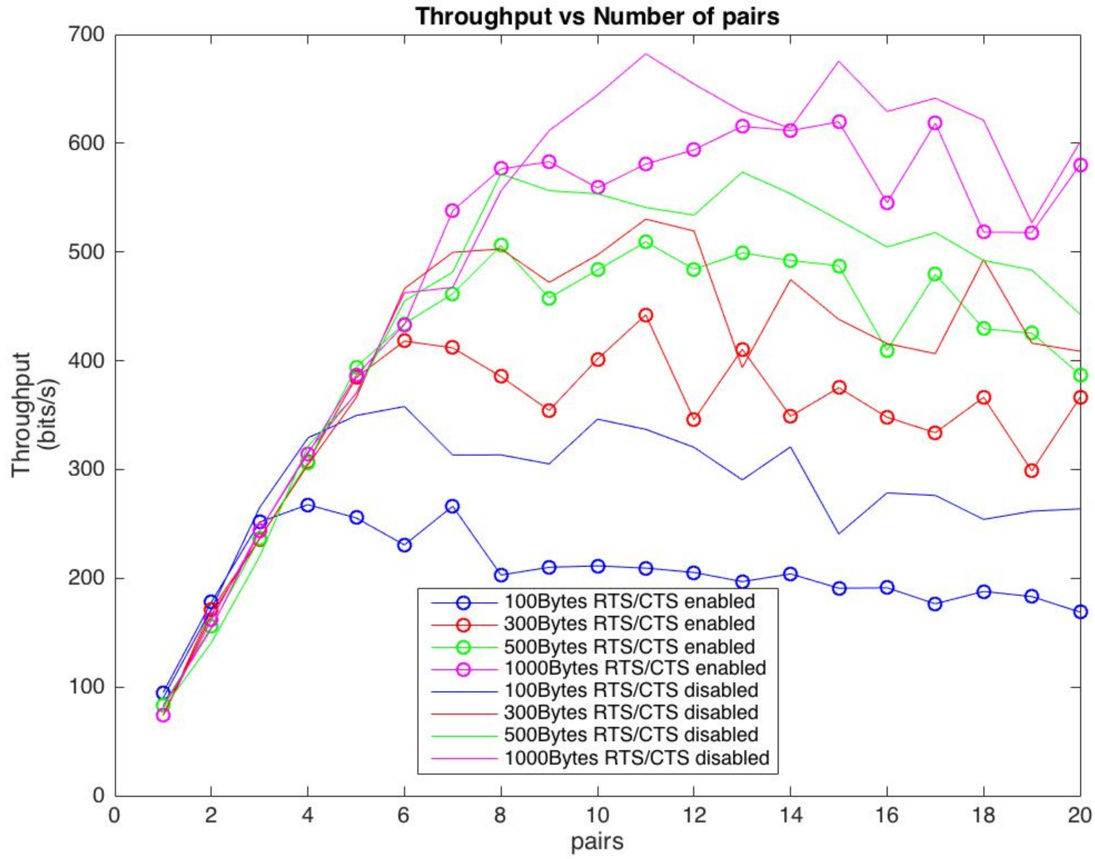

Figure 3.1

In this part we change the packet size into 4 different values which are 100 bytes, 300 bytes, 500 bytes and 1000 bytes. And we also change the interval respectively in order to have a 80kbps throughput per pair.

Besides all we talk about above, it is obvious that the larger the packet size is, the higher throughput It gets when $n > 6$. It is because when $n < 6$, the traffic is light, the throughput of network is completely depended on the number of transmitting pairs. During this period, the throughput of each network goes up linearly. As the number of pairs increases, the smaller the packet size network has, the heavier traffic it has since it has more packet to send in order to acquire the same throughput.

From this figure we can see that the larger the packet is, the less the difference between RTS/CTS enabled and RTS/CTS disabled with respect to each value of packet size. Since the packet size of RTS/CTS is much smaller. The duration of collision is significantly reduced, which leads to a better performance of RTS/CTS. And also the difference of two curves with respect to each packet size network is less as the number of pairs increases.

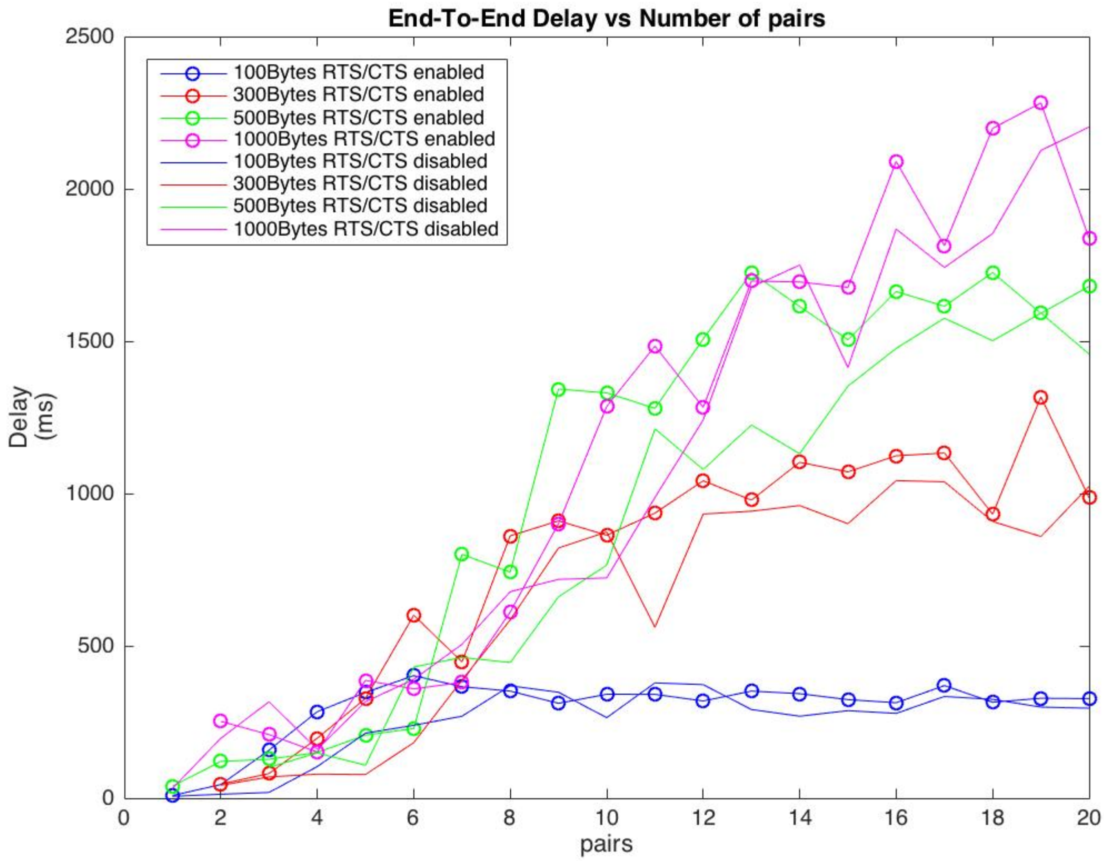

Figure 3.2

As for End-To-End delay of each packet size, still we do not have retransmission scheme, so we cannot consider the effect of packet loss. As for each successfully transmitted packet, the larger the packet is, the higher the delay is when the traffic load is not light.

And there is no such big difference among them when the traffic load is low as well.