CS244 PA2 Writeup

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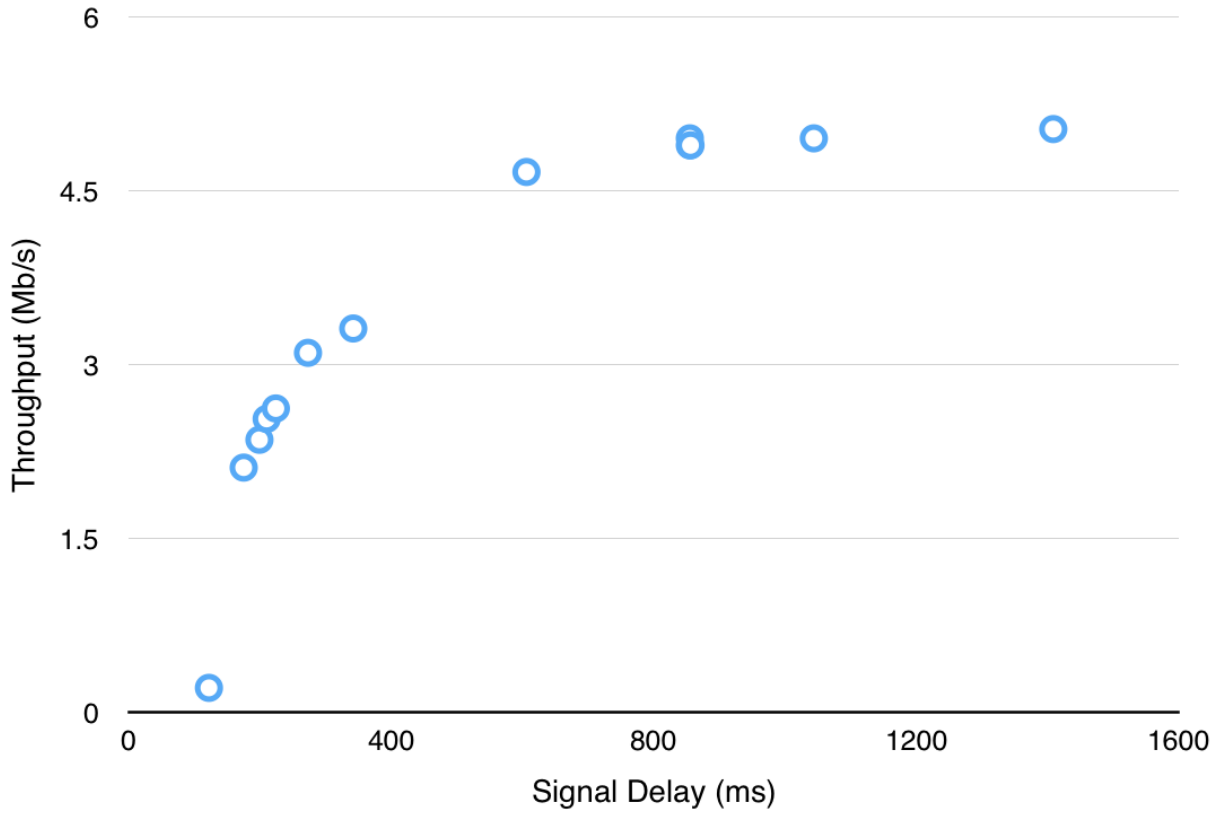
Warmup exercise A

Varying CWND

cwnd	Signal Delay (ms)	Throughput (Mb/s)	log(thuput/dela	Per-Packet Qu
1	122	0.21	1.72131147540	20
12	175	2.11	12.0571428571	66
14	199	2.35	11.8090452261	72
15	210	2.53	12.0476190476	75
16	224	2.62	11.6964285714	81
20	273	3.10	11.3553113553	96
25	342	3.31	9.67836257309	120
50	606	4.66	7.68976897689	238
75	855	4.89	5.71929824561	375
75	855	4.95	5.78947368421	373
75	856	4.89	5.71261682242	372
100	1044	4.95	4.74137931034	512
150	1409	5.03	3.56990773598	819

Generally as we increase a constant CWND, throughput and signal delay both increase. The variance for multiple runs with the same CWND (shown here at CWND = 75) is relatively low, even on the VirtualBox VM. We determined that the optimal value for a constant CWND is probably between 12 and 15.



Warmup exercise B

Warmup exercise C

This delay-triggered scheme doesn't work very well. Below are our various results from runs.

Linear increase, exponential decrease, thresh = 75: $\frac{1.55}{0.205} = 7.56$
Linear increase, linear decrease, thresh = 75: $\frac{2.46}{0.479} = 5.14$
Exponential increase, exponential decrease, thresh = 75: $\frac{2.46}{0.220} = 11.18$
Exponential increase, exponential decrease, thresh = 100: $\frac{2.90}{0.289} = 10.03$
Exponential increase, exponential decrease, thresh = 85: $\frac{2.58}{0.229} = 11.26$

Exponential increase and decrease with a threshold of 85ms worked the best. We believe this is because it allows the window to more rapidly adjust to changing network conditions compared to linear adjustments. Also, a threshold too low doesn't optimize for throughput, while a threshold too high adjusts too late.

Warmup exercise D

Our final algorithm combines AIMD and RTT thresholding with a method for linearly decreasing CWND as the queue builds.

The AIMD portion of the algorithm contains a slow start phase, for aggressive recovery from stretches of very low throughput, and a linear increase phase once CWND has passed a predefined threshold. This threshold we set at our optimal constant CWND result from warmup A.