

1. Which backoff protocol appears to give the best (lowest) average latency value as the number of devices tends to infinity?

The loglog backoff has the lowest average latency when approaching infinity. As the nodes increase steadily the latency also increases. There is no immediate increase. As we know from this class, the loglog backoff works as $(1 + 1/\log_2 \log_2(|W_j|)) * |W_j|$ (*all the logs are base of 2). When value is not an integer, we take the floor of the value. With LogLog backoff protocol it has higher chances of removing all the timeslots. Loglog is the most efficient of three backoff protocols and has lower latency overall.

2. Which backoff protocol appears to give the worst (highest) average latency value as the number of devices tends to infinity?

The linear backoff seems to have the worst and highest latency with large jumps from the increase in nodes. Compared to the other two protocols at node 3000 linear has more than double latency. That is because the linear backoff has the probability of finding time in linear time and increment the probability by adding one space.

3. Why do you think the worst (in terms of latency) protocol is behaving so poorly compared to the other two?

For linear the window size is only increased by one as the other two protocols are increased by multiple, making the latency for linear much larger. Because linear backoff is increased in linear time. On the other hand, another back off protocol used a randomized algorithm called Binary exponential Backoff (BEB) is more efficient than liner backoff. BEB chooses random value r in round i . Then senses the channel, if idle, it sends in "time slot" r . If it is successful, then terminates and repeats with $i+1$. In BEB if window size $\Theta(n/\log n)$, then no singletons. If window size $\Theta(n)$, then gets singletons. BEB gets $\Omega(1/\log n)$ throughput. Thus, BEB has more efficient run time than linear backoff, and has lower latency.

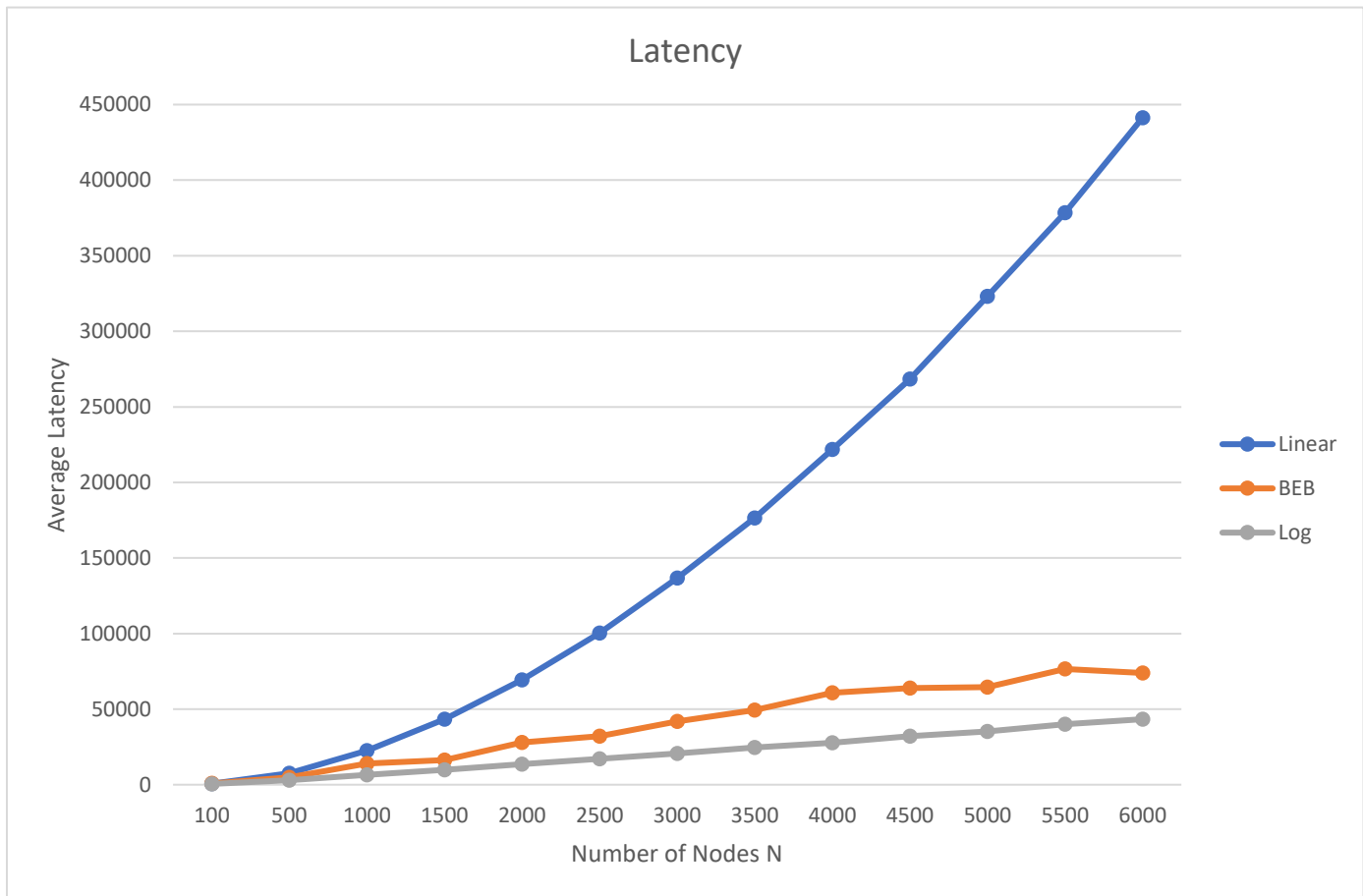


Chart in Microsoft Word

	A	B	C	D
1	Nodes	Linear	BEB	Log
2	100	697	839	535
3	500	7619	4889	3077
4	1000	22561	13955	6540
5	1500	43359	16271	9925
6	2000	69456	28003	13634
7	2500	100402	32104	17144
8	3000	136835	41920	20765
9	3500	176407	49485	24557
10	4000	221794	60903	27838
11	4500	268359	63998	32212
12	5000	323116	64578	35305
13	5500	378368	76574	39932
14	6000	441282	74021	43350