



ASSIGNMENT 4

Adaptive Tree Walk MAC Protocol

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Observations

Probing at most of the given levels eventually levels off to about a 50% success rate.

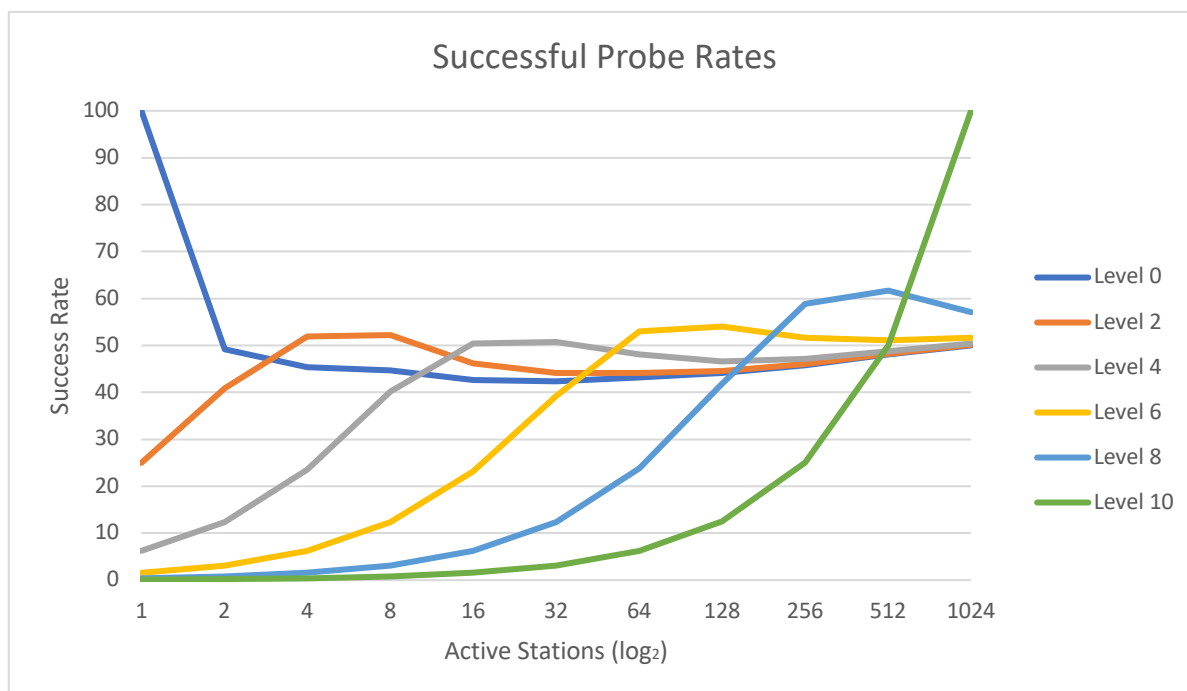
When there is one active station, probing at the level 0 gives very good results. This is because this is guaranteed to be free of collisions. However, as the level increases (with one active station), the successful probe rate decreases logarithmically.

At level 10, all nodes are probed individually so there is never any collision. A higher number of active stations results in less idling and thus a higher success rate. It makes sense that since all stations are active that there would be a 100% success rate.

As the number of active stations increases, the success rate of each level generally increases (save for level 0) and drops back down slightly before leveling off (save for level 10). The reason for this may be that probing k active stations is optimal (fewest collisions and idling) at the point when the success rate is no longer increasing. Before that point, there are still collisions. After that point, we are probing more groups of stations than is necessary, thereby increasing the number of probed idle stations.

Successful Probe Rates for MAC TreeWalk algorithm

The following graph depicts the success rates for probing when k stations are active, where $k=1, 2, 4, 8, 16, 32, 64, 128, 256, 512$, and 1024 .



Success, Collision and Idle Rates

The table on the following page summarizes the success, collision and idle rates when probing to the tenth decimal.

Probe (Success/Collision/Idle) Rates (%)

Level	Number of Active Stations										
	1	2	4	8	16	32	64	128	216	512	1024
0	100/ 0/ 0	49.1/ 50.9/ 0	45.4/ 54.7/ 0	44.7/ 55.3/ 0	42.6/ 57.4/ 0	42.4/ 57.6/ 0	43.2/ 56.8/ 0	44.2/ 55.9/ 0	45.8/ 54.2/ 0	48.1/ 52/ 0	50/ 50/ 0
2	25/ 0/ 75	40.9/ 12.3/ 46.8	52/ 30.9/ 17.1	52.2/ 45.7/ 2.1	46.2/ 53.6/ 0.2	44.1/ 55.9/ 0	44.1/ 55.9/ 0	44.6/ 55.4/ 0	46.1/ 53.9/ 0	48.2/ 51.8/ 0	50.1/ 49.9/ 0
4	6.3/ 0/ 93.8	12.3/ 1/ 86.7	23.6/ 3.4/ 73	40.2/ 12.4/ 47.4	50.4/ 31.7/ 18	50.8/ 46.2/ 3.1	48.1/ 51.8/ 0.1	46.6/ 53.4/ 0	47.1/ 52.9/ 0	48.7/ 51.3/ 0	50.4/ 49.6/ 0
6	1.6/ 0/ 98.4	3.1/ 0/ 96.9	6.2/ 0.2/ 93.6	12.3/ 0.8/ 86.8	23.2/ 4.5/ 72.3	39.2/ 13.5/ 47.3	53/ 28.6/ 18.4	54.0/ 42.8/ 3.2	51.6/ 48.3/ 0.1	51.1/ 48.9/ 0	51.6/ 48.4/ 0
8	0.4/ 0/ 99.6	0.8/ 0/ 99.2	1.6/ 0/ 98.4	3.1/ 0/ 96.8	6.2/ 0.2/ 93.6	12.3/ 0.8/ 86.9	23.8/ 2.7/ 73.5	41.8/ 9.2/ 49	58.9/ 22.6/ 18.5	61.7/ 36.5/ 1.9	57.1/ 42.9/ 0
10	0.1/ 0/ 99.9	0.2/ 0/ 99.8	0.4/ 0/ 99.6	0.8/ 0/ 99.2	1.6/ 0/ 98.4	3.1/ 0/ 96.9	6.25/ 0/ 93.75	12.5/ 0/ 87.5	25/ 0/ 75	50/ 0/ 50	100/ 0/ 0