EE597 Lab 2 Report

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Test Case	Latency
test 1a	16.1427
test 1b	16.1761
test 2a	12.1451
test 2b	12.1618
test 3a	0.4528
test 3b	0.2426
test 4	0.3678
test 5	3.9345

Bandwidth: 54000000 bps

Test Case	Latency
test 1a	16.1534
test 1b	16.1542
test 2a	12.1570
test 2b	12.1594
test 3a	0.3729
test 3b	0.4117
test 4	0.2606
test 5	3.1386

Bandwidth:54000bps

In Lab2, I used emulate software to simulate the connection between each UAV and each target, and determined that each UAV can only track one target and will not track the target being tracked by other UAVs. I ran the test script and obtained the latency data in the table above. In the test, I only changed the bandwidth and kept other parameters unchanged. The bandwidth of the first table is 54000000 bps, and the bandwidth of the second figure is 54000 bps.

From the experimental data, I reduced the bandwidth by 1000 times, but the delay of each test did not increase, and it can even be said to be almost unchanged. From this, we can conclude that communication between UAVs is not sensitive to the bandwidth change of the network. Even in an environment where the network bandwidth fluctuates greatly, communication between UACs will not be affected.

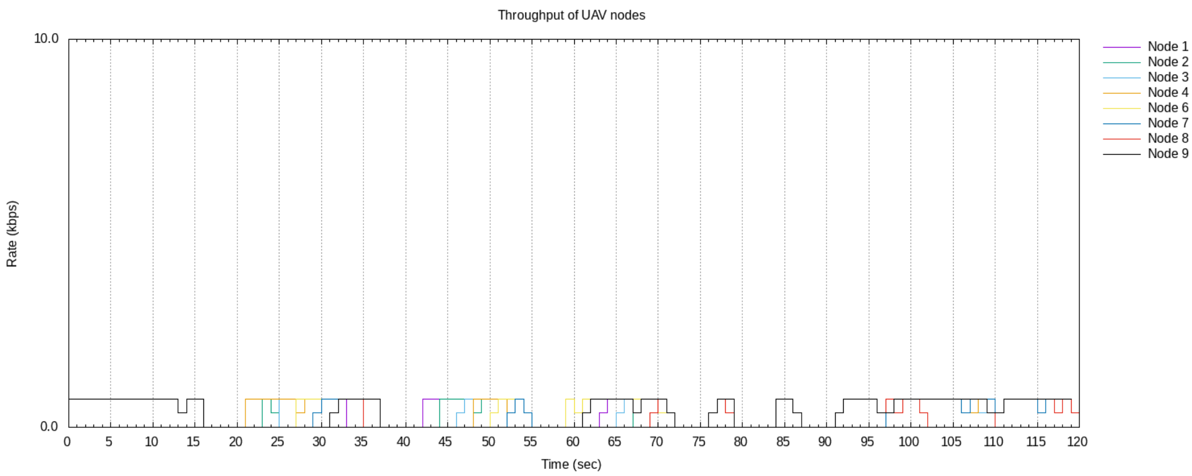
Analysis of Each Test Result:

Test 1a and 1b: It will move all targets within the range with a 2 seconds interval between. Since there is a 2-second delay before each target is moved into the range, each UAV has enough time to compete for the target, and then the allocation strategy I set will determine which UAV can obtain the target and which one needs to give up. Each time a target is moved in, the remaining UAVs will compete for the target at the same time, and then communicate with each other through UDP to determine who finally gets the target, until all UAVs get the only target. So these two tests resulted in the highest latency.

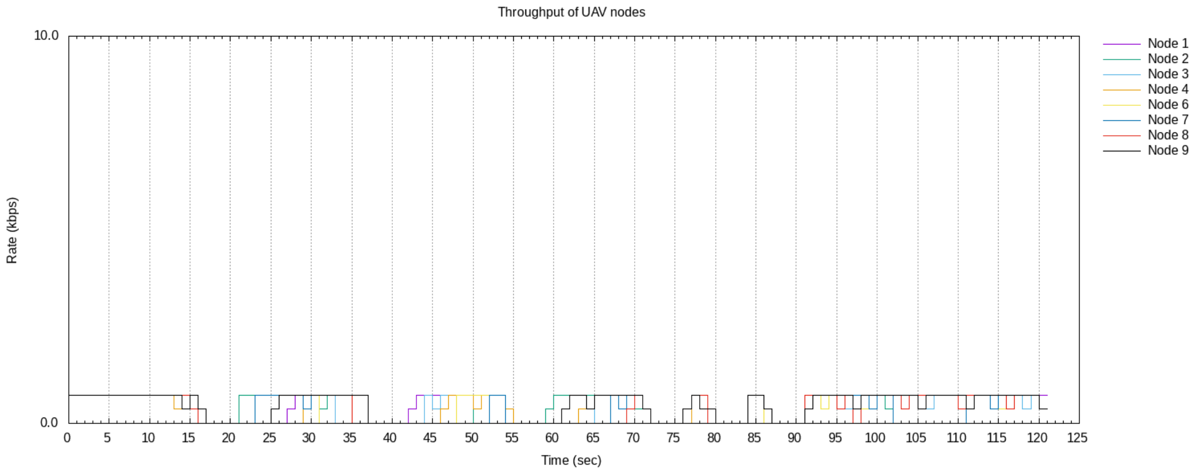
Test 2a and 2b: These two test cases will move 6 out of 8 targets within range in order or out of order with a 2 second interval between. This test case is very similar to the test 1a and 1b. Since only 6 out of 8 targets were moved into the range, the agreement protocol only ran 6 times, so it is reasonable that the latency is shorter than in test 1a and 1b.

Test 3a and 3b: These two test cases will move all targets within the range in order or out of order immediately. Because all targets are moved into the range immediately, no 2 seconds interval between. So the communication between each UAV can happen immediately and continuously the moment all targets are moved in through the agreement protocol I designed. This leads to a significant reduction in latency.

Test 4 and Test 5: These two test cases are basically very similar to test 3a and test 3b. Because one or two UAVs crashed, there was less contention among all UAVs, resulting in less latency.



Bandwidth:54000



Bandwidth:54000000

The first graph is the throughput of each node when the bandwidth is 54000, and the second graph is the throughput when the bandwidth is 54000000. When the bandwidth is different by a factor of 1000, there is no significant difference in throughput. This indicates that the bandwidth has not reached a bottleneck. The throughput performance is very stable. This shows that the agreement protocol I developed can run stably even when the throughput fluctuates severely.