Lab Report

Course Title: Computer Networks Lab

Autumn 2024
Section:7BF

Lab No: 5

Name of Labwork: Create your own message type i.e. packet which has 3 fields namely source, destination and hopCount. Run several configurations and show hop counts in a plot. Also calculate the mean, standard deviation of hop counts.

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Marks

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Name of Labwork: Create your own message type i.e. packet which has 3 fields namely source, destination and hopCount. Run several configurations and show hop counts in a plot. Also calculate the mean, standard deviation of hop counts.

1. Introduction:

In this lab, we will create a custom message type (packetPP) with three fields: source, destination, and hopCount. The objective is to simulate a network where packets are forwarded from one node to another, counting the number of hops until they reach their destination. After running several configurations, we will gather hop count data, calculate its mean and standard deviation, and display the results using a plot.

2. Constructing Network(NED):

We will define a simple network of nodes using OMNeT++'s NED language. Each node will randomly forward messages through its connected gates until the message reaches its destination.

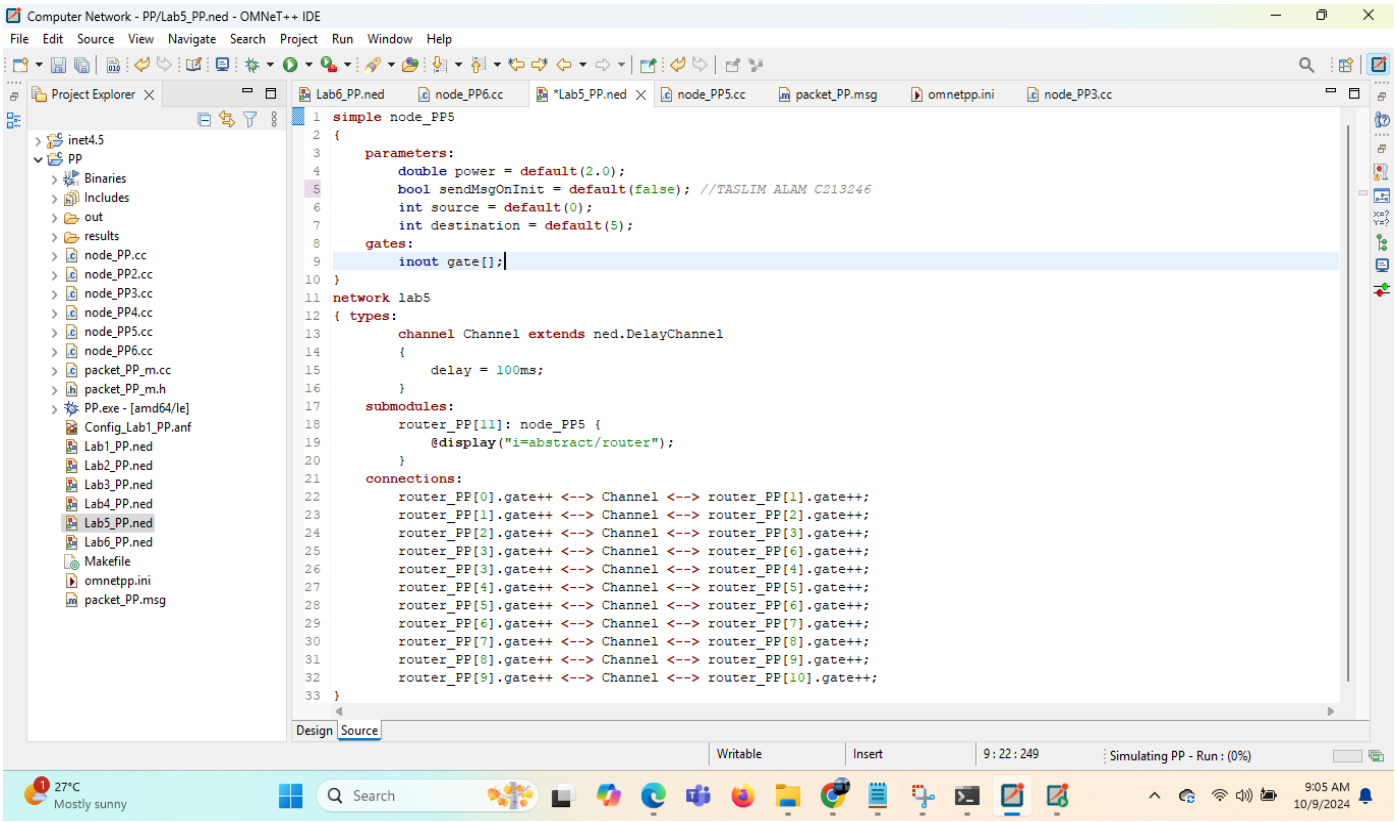

Figure 1: Laptop view of NED file

3. Building Module(C++ file):

The custom packet type will be defined with three fields: source, destination, and hopCount. Nodes will randomly forward packets to other nodes until they reach the destination.

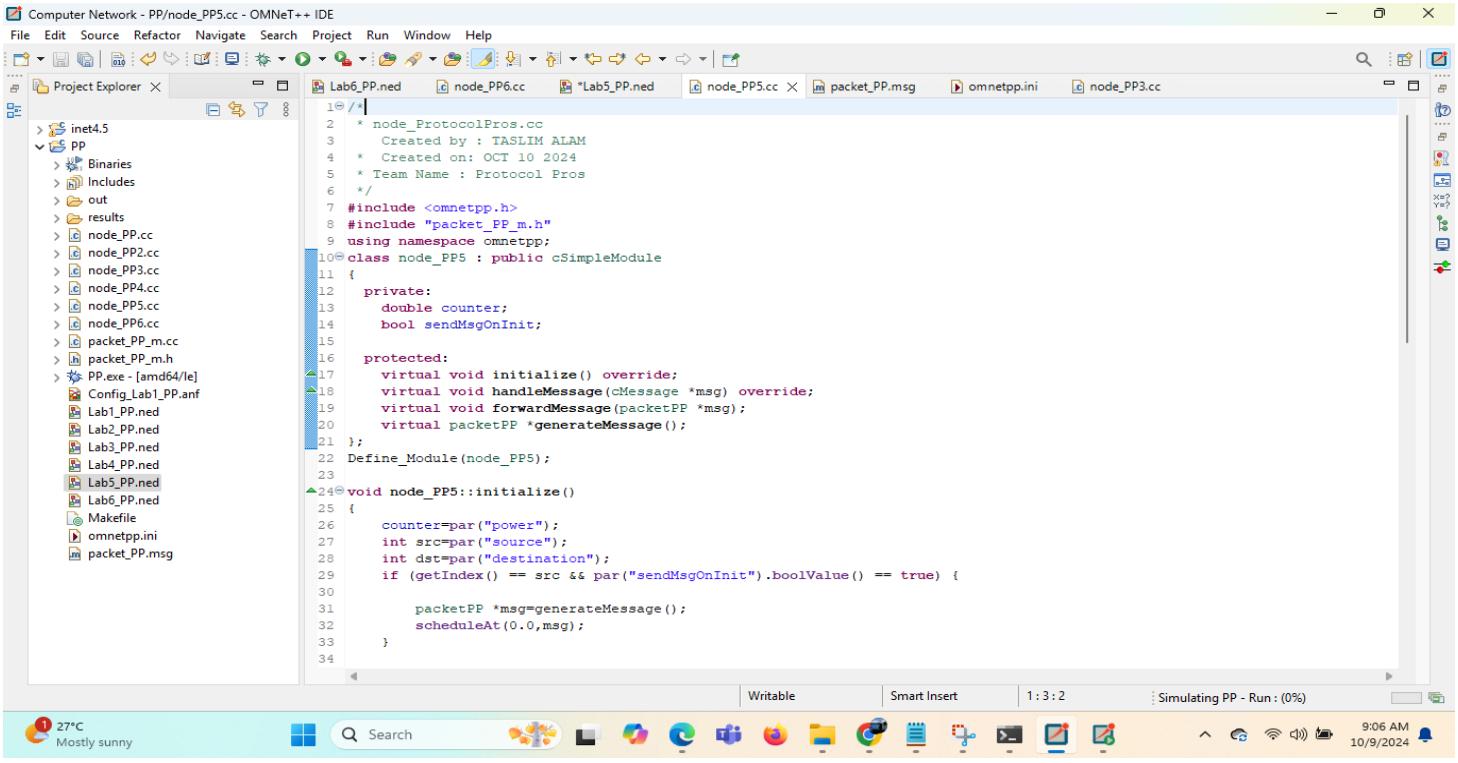

Figure 2.1: Laptop view of cc file

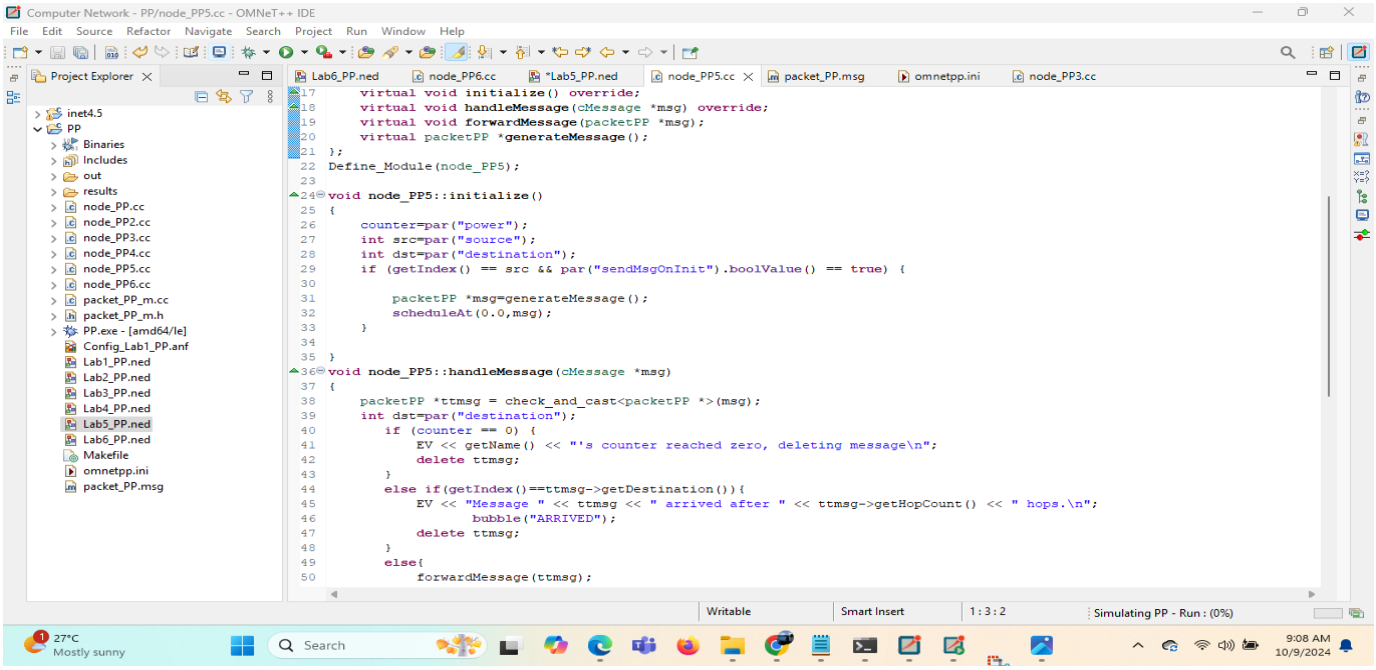

Figure 2.2: Laptop view of cc file

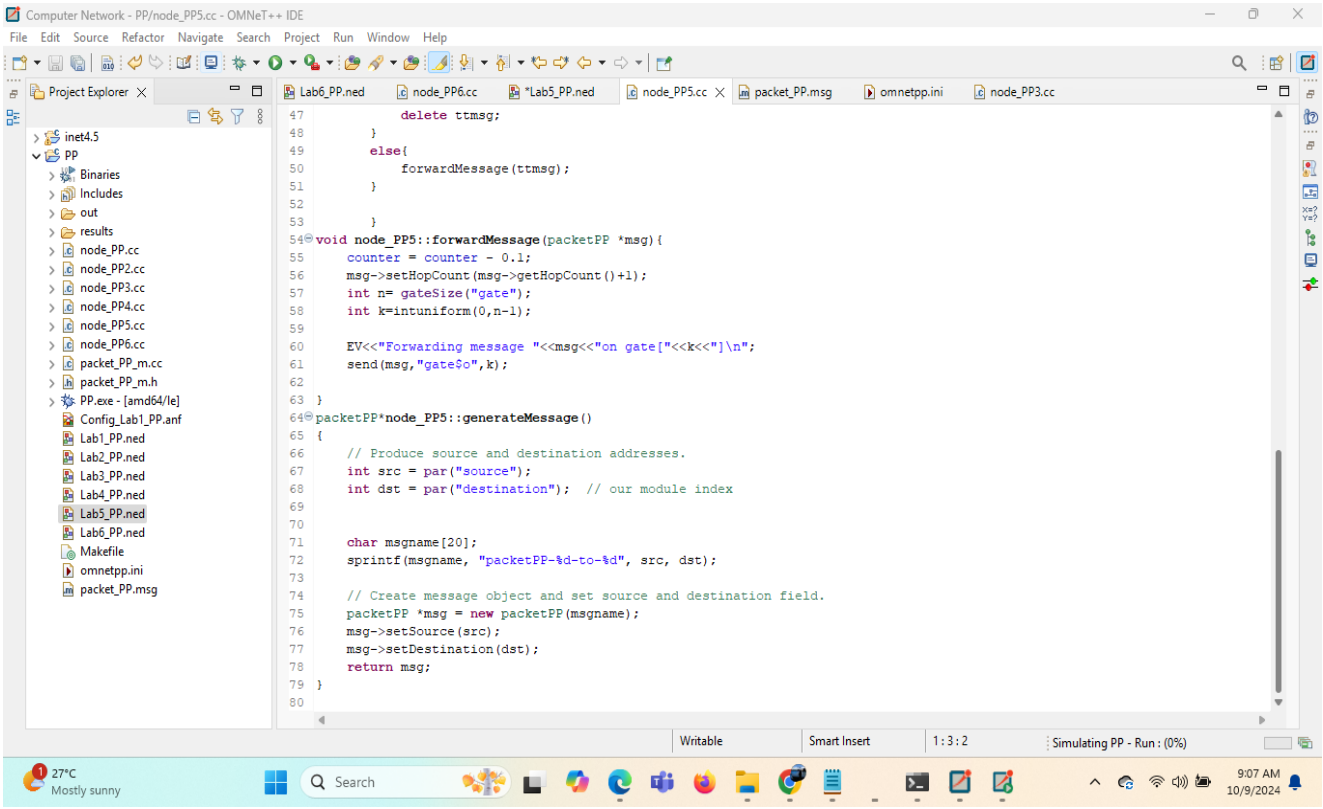

Figure 2.3: Laptop view of cc file

4. Initializing simulation(ini file):

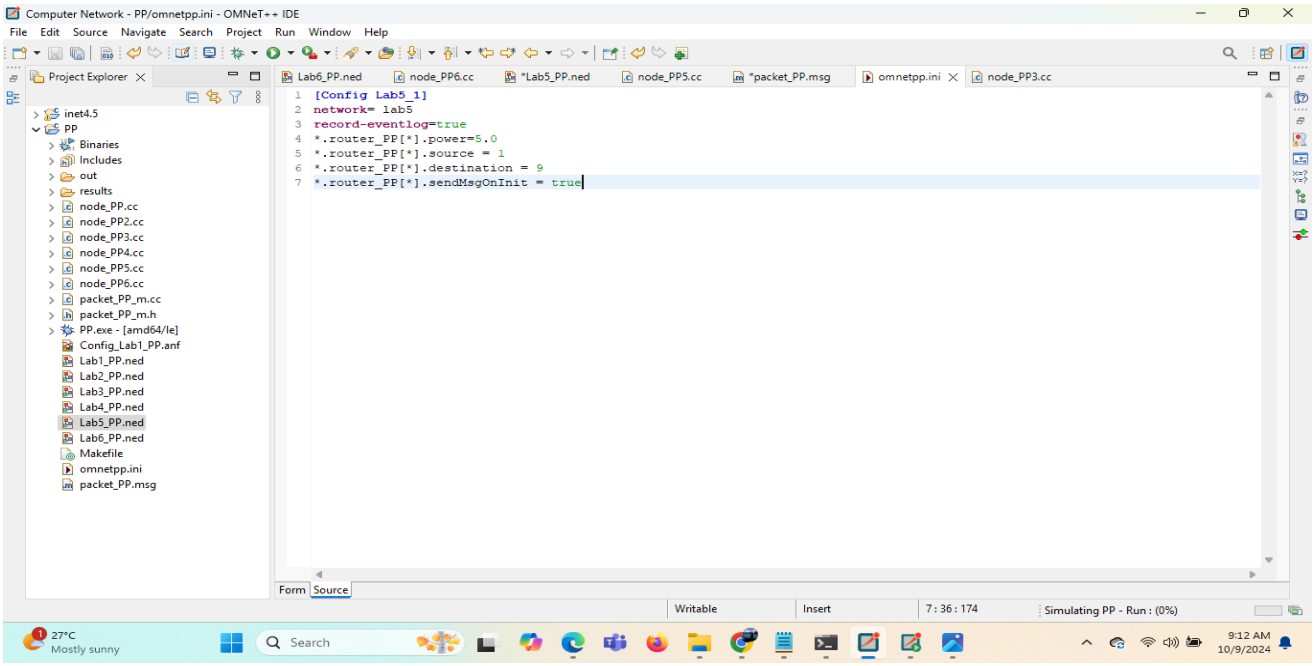

Figure 3: Laptop view of ini file

5. Msg file:

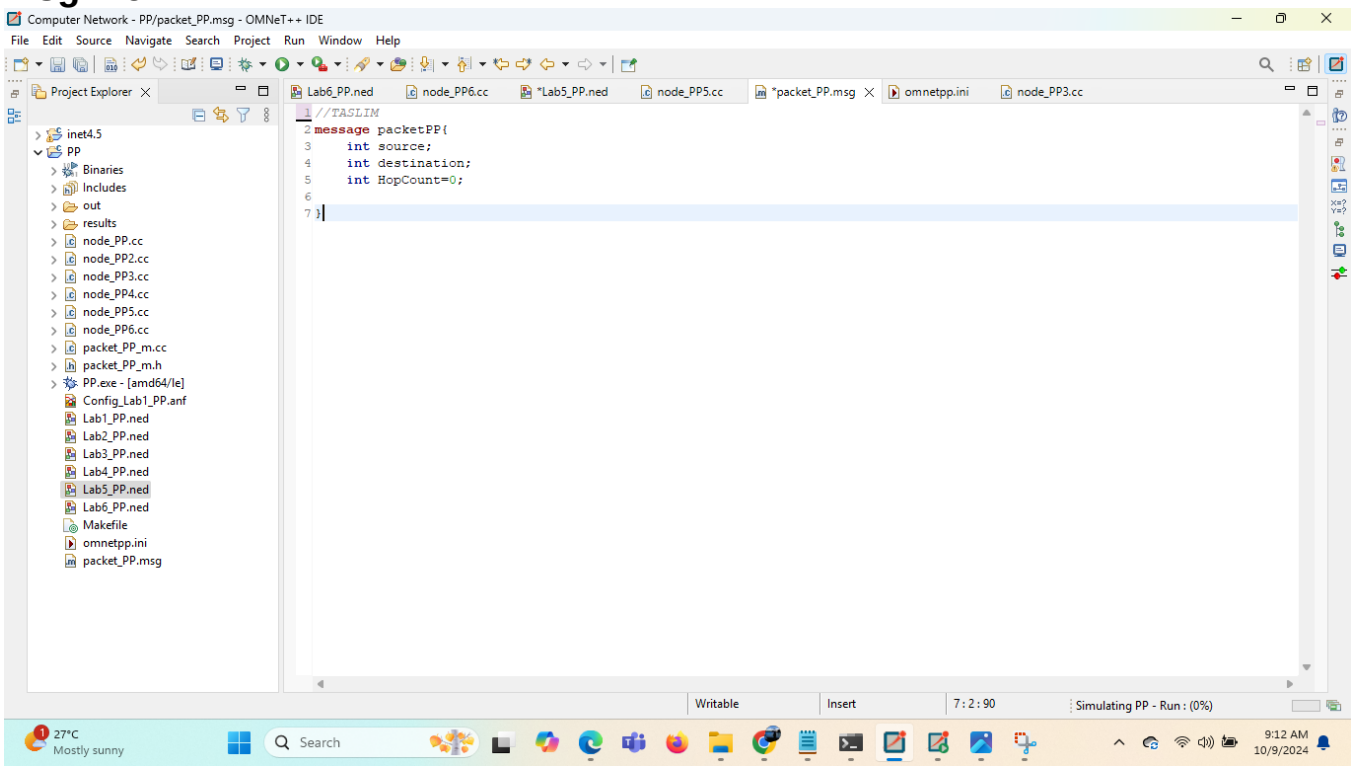

Figure 4: Laptop view of msg file

6. Experiment:

In this extended lab, we use the msg file to track the routing information of messages within a network or communication system. Also hop count to the number of intermediary nodes or hops that the message traverses while moving from the source to the destination. Each hop typically represents a network node or a routing point that forwards the message towards its final destination.

7. Result and Analysis:

Average Hop count:

Serial no	Source	Destination	Hops
1	0	5	17
2	3	5	11
3	0	3	45
4	4	5	2
5	5	4	1

Average count:
Sum = 76
Count=5
AVERAGE =15.2

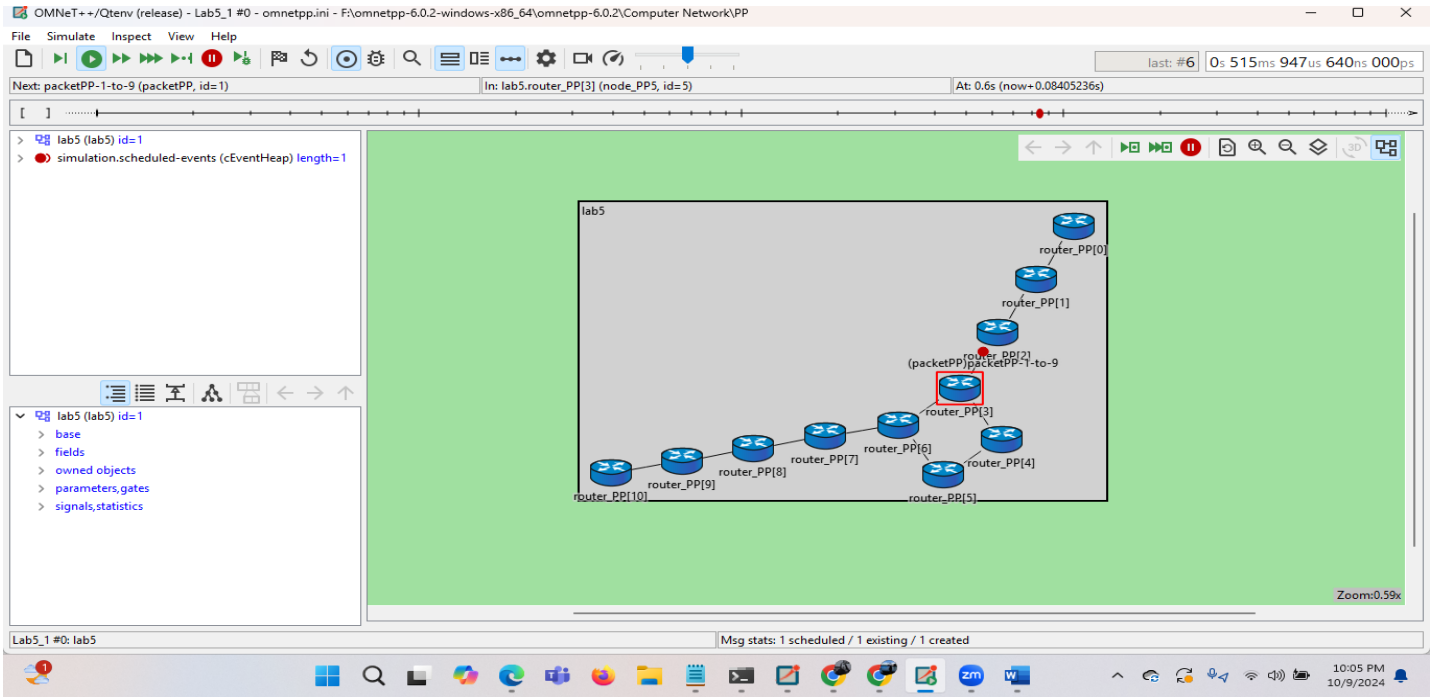

Figure 5.1: Laptop view of result

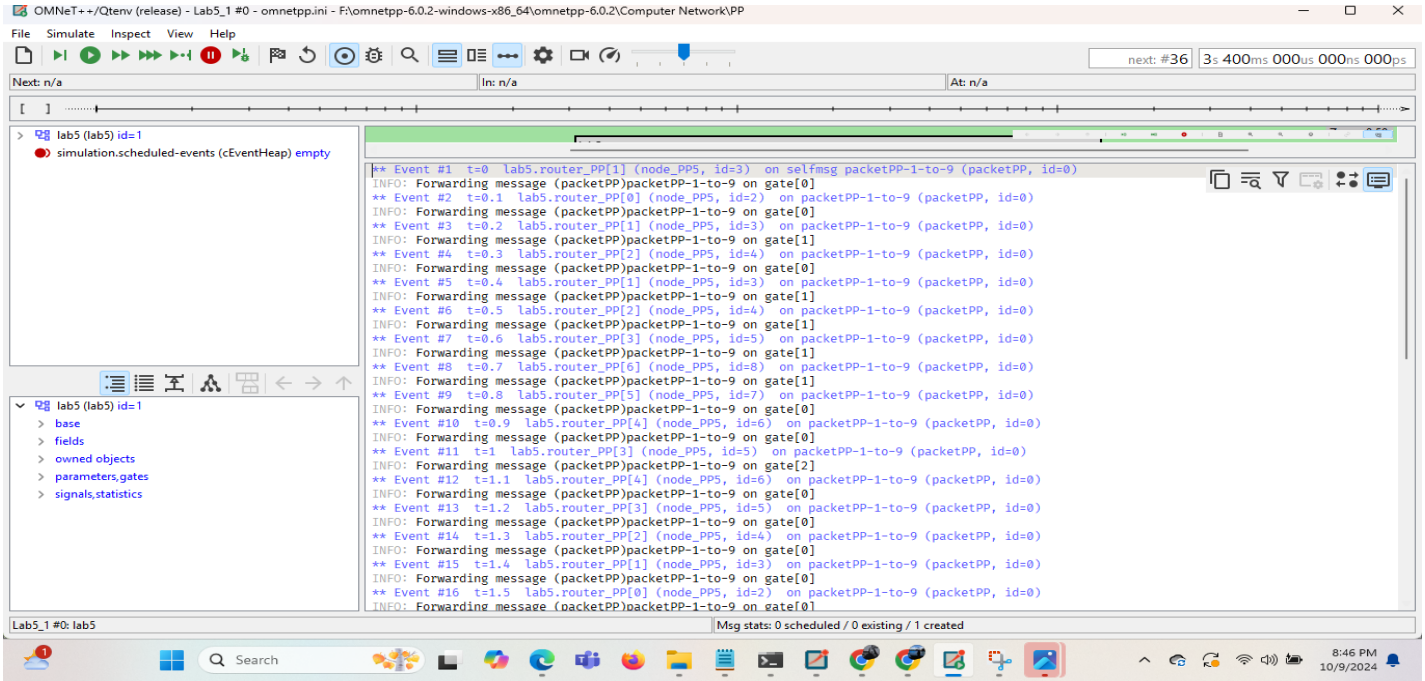

Figure 5.2: Laptop view of result

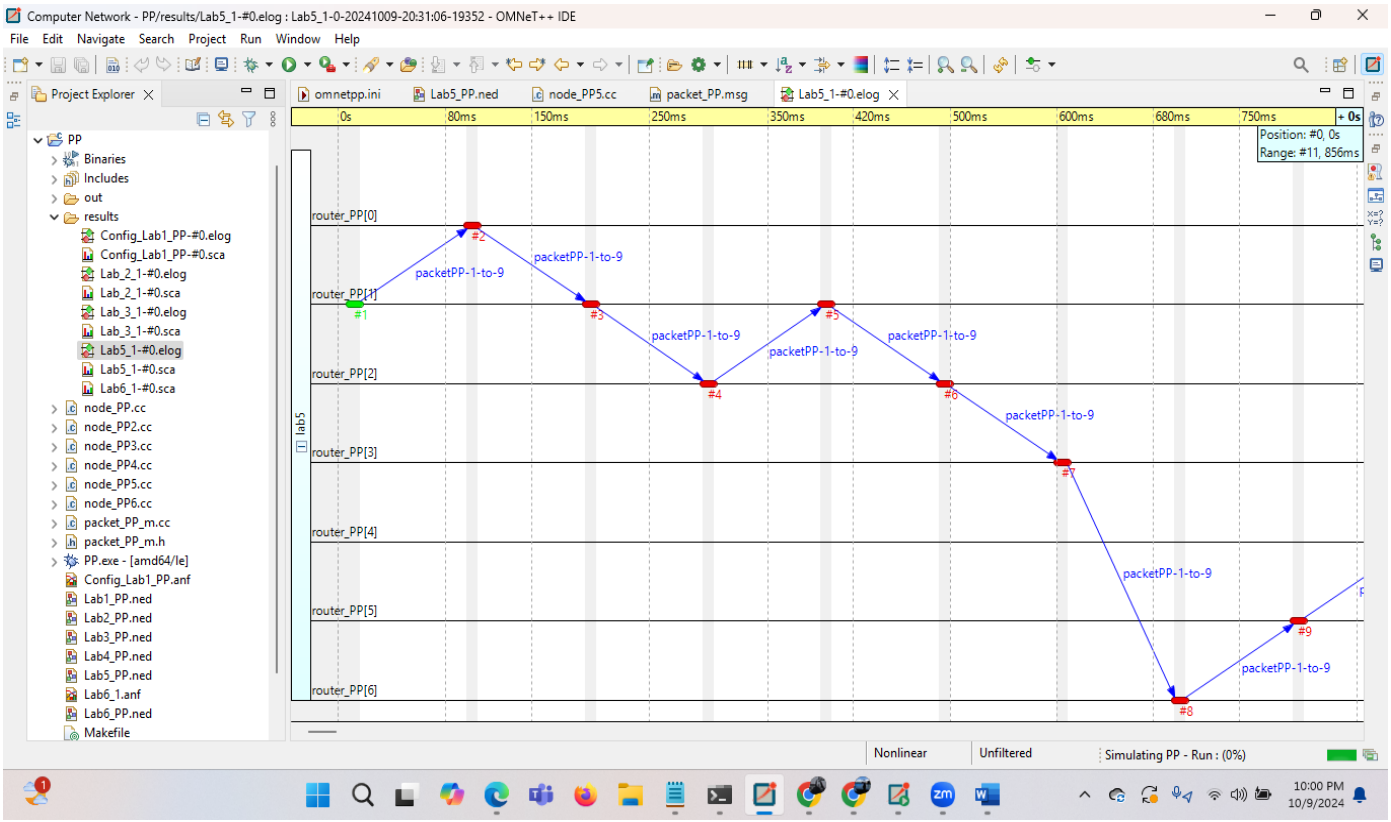

Figure 5.3: Laptop view of sequence diagram

Result and Analysis:

The average hop count is calculated by summing up all hop counts from the table and then dividing the total by the number of entries in the table. By analyzing the hop counts, we can identify potential areas for optimization, evaluate network congestion, and ensure reliable communication between sources and destinations. The average hop count provides a quick metric to gauge overall network performance, aiding in decision-making for network enhancements and improvements.

8. Conclusion:

Doing this lab work showcased its associated hop counts provides actionable insights for improving the communication network's performance, reliability, and efficiency. It aids network administrators and engineers in making informed decisions to enhance the overall quality of service for message transmission.