Homework 7: Routing Protocols

CN Sec A 2025

In this assignment, we will observe behavior of a static, and a dynamic routing protocol through simulation in ns-3. We will simulate a link failure in a network which triggers the dynamic routing protocol to update routing table, whereas the static routing protocol does not. The global routing protocol is a link-state protocol that configures the routing table once at the beginning of the simulation, hence it is static in this simulation. Routing information protocol (RIP) is a dynamic distance-vector protocol.

Q1. (2.5 Marks) Copy the given “routing.cc” file to the scratch folder in your ns-3 installation and run it. The file will simulate following network configuration in fig. 1 and start an application that send packets from Node 1 (src IP: 10.0.1.1) to Node 6 (dest IP: 10.0.3.2).

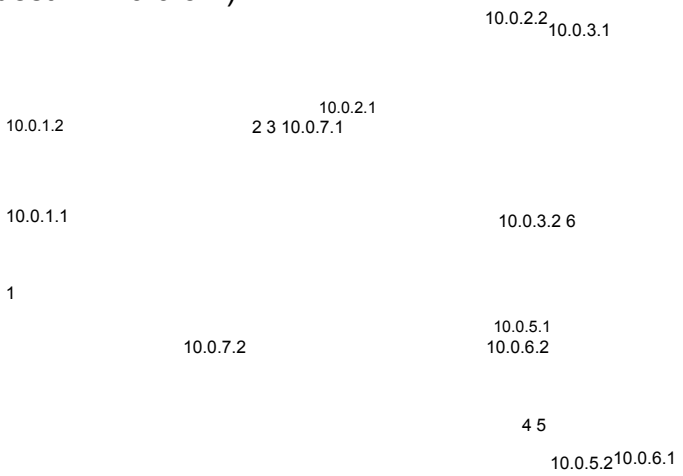

Figure 1: Network topology

Report what is packet delivery ratio, number of packets delivered for each routing protocol, i.e. RIP and Global routing, from the script’s output.

Q2. (2.5 Marks) Uncomment the code block at line 133 to simulate a link failure between nodes 2 and 3. Run the simulation and report packet delivery ratio, number of packets delivered for each routing protocol.

Q3. (5 Marks) While keeping the code-block that simulates link failure uncommented, uncomment the code-block below line 148 to print routing table of node 2 at differ ent time-instants during the simulation. Run the simulation and read the routing tables printed in text files named “rip-routing.routes” and “global-routing.routes”. Determine the gateway for destination “10.0.3.2” from the routing tables and fill the following table 1:

Time Instant	Gateway for Global Routing Protocol	Gateway for RIP

10 sec		
60 sec		
120 sec		
180 sec		
240 sec		
300 sec		

Table 1: Table for Ques 3

Justify that RIP is a dynamic protocol in this simulation based on your observation in the table. Come up with a hypothesis to explain the difference in packet delivery ratio reported in question 2 based on the routing table. Submit the two ".routes" text files as evidence along with your report.

Q4. (10 Marks) While keeping the code uncommented from the previous question, edit the code to add two new nodes, say node 7 and 8, between nodes 3 and 6 as shown in fig. 2.

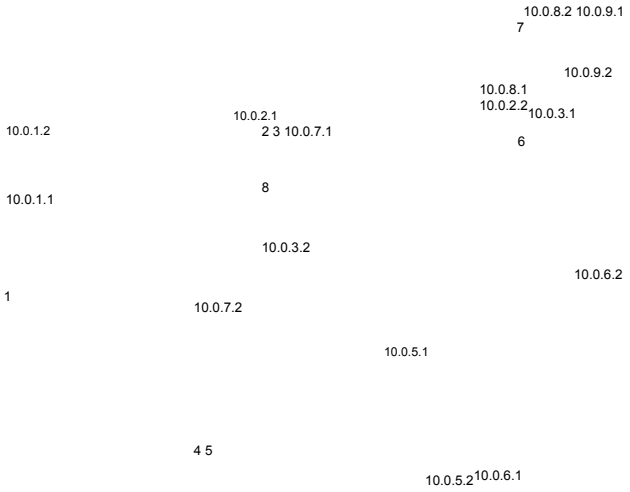

Figure 2: Network topology

Run the simulation, you should observe that the packet delivery ratio has increased and is of same value for both routing protocols. Explain why with evidence (Hint: Read the routing tables). Submit the two ".routes" text files as evidence along with your report.

Submission Instructions

Submit your final working code, the “.routes” text files, and a report with answers to all the questions.