

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).

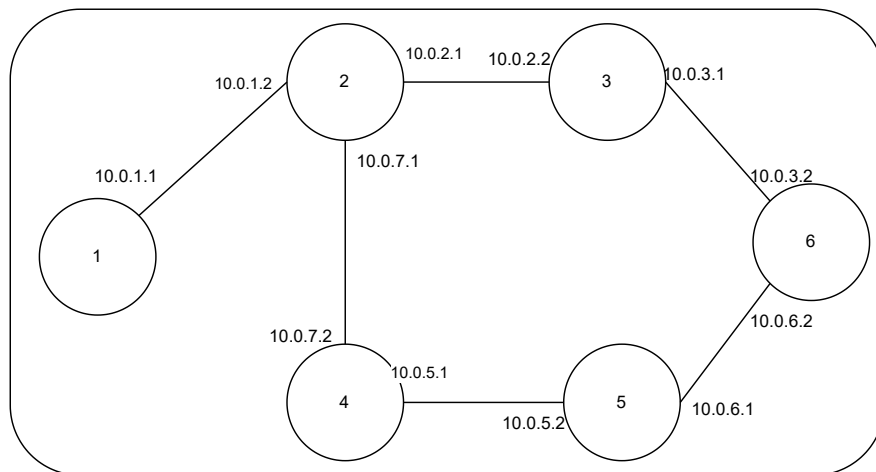


Figure 1: Network topology

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 different 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.

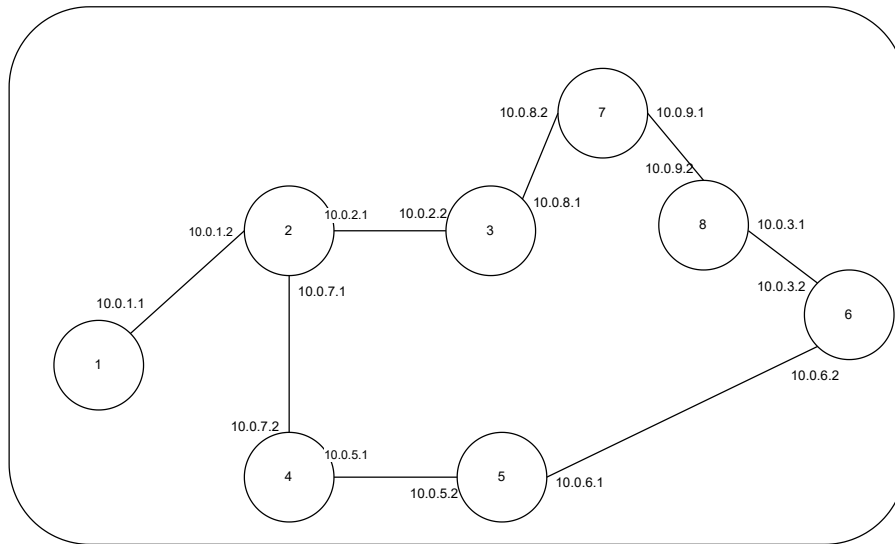


Figure 2: Network topology

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.