

Network Simulation Report

Tool Name: NetTopoGen – Advanced Network Simulator
Simulation Date: 31-12-2025
Simulation ID: Auto-Generated
User Mode: Automatic
Topology Type: Tree

1. Network Overview

This report presents the results of a network simulation performed using the NetTopoGen framework.

The objective is to analyze routing behavior, QoS impact, and network resilience.

2. Topology Configuration

2.1 Device Summary

Device Type	Count
Router	3
Switch	3
PC	10
Hub	0

2.2 Connectivity Summary

Average node degree: 1.9

Redundant paths available: No

Single point of failure: Yes

3. Link Characteristics

Metric	Min	Max	Avg
Delay (ms)	10.5	15.0	13.3
Bandwidth (Mbps)	10	1000	430.0
Packet Loss (%)	1.0	1.0	1.00

4. QoS Configuration

$$Cost = \alpha \cdot Delay + \beta \cdot (1/Bandwidth) + \gamma \cdot Loss$$

Parameter	Value
α (Delay)	4.4
β (Bandwidth)	3.3
γ (Loss)	2.2

QoS Focus: Delay Optimized

5. Routing Algorithm Evaluation

Algorithm	Hop Count	Total Cost
Dijkstra	3	285.8
Bellman-Ford	3	285.8
A*	3	285.8
BFS	3	285.8
QoS-Metric	3	285.8
RIP-like	3	285.8
OSPF-like	3	285.8

6. Optimal Path Selection

Selected Algorithm: Unknown

Optimal Path: OSPF Path: R0 → R2 → Switch2 → PC9

Minimum Cost: 285.8

Reason: Lowest composite QoS cost under current weight configuration.

7. Traffic Simulation Results

Metric	Value
Traffic Type	Bursty
Avg Delay	High
Packet Loss	High
Path Used	Path via R2
-	-
Traffic Type	CBR
Avg Delay	Low
Packet Loss	Low
Path Used	Path via R2
-	-

8. Fault Injection Analysis

Injected Faults: None

9. Visualization Summary

- Active routing paths highlighted using color coding
- Link metrics displayed dynamically
- Packet flow animated hop-by-hop
- QoS changes reflected instantly in path selection

10. Key Observations

- QoS-aware routing adapts effectively to changing network conditions
- Fault injection demonstrates network resilience
- Visualization enhances understanding of routing dynamics