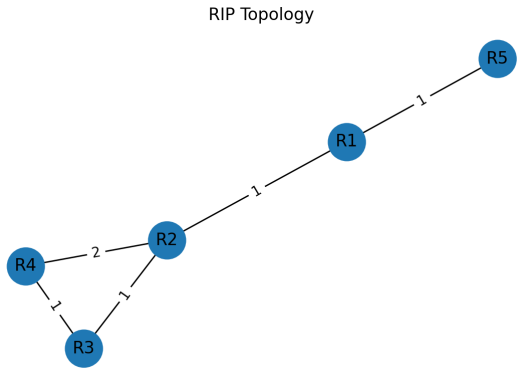
Lab Assignment 7: Routing Protocols Simulation in Python

Author: Abhinandan Porwal

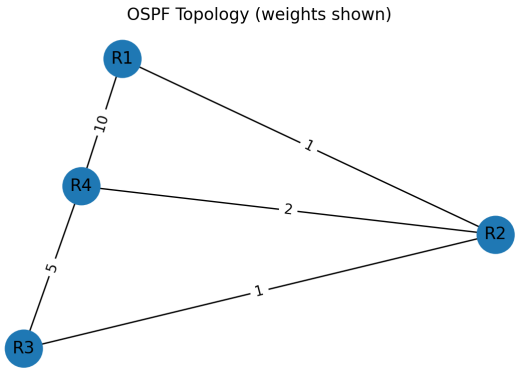
Date: October 17, 2025

Objective

Simulate routing protocols (RIP, OSPF, BGP, IS-IS) in Python. Show topologies, routing tables, and compare convergence and overhead.



RIP Topology



OSPF Topology

Snapshot: rip_tables.json

Router: R1

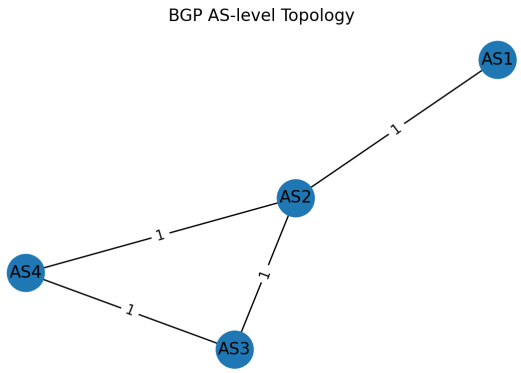
R1	AS-PATH: 0 R1
R2	AS-PATH: 1 R2
R3	AS-PATH: 2 R2
R4	AS-PATH: 3 R2
R5	AS-PATH: 1 R5

Snapshot: ospf_tables.json

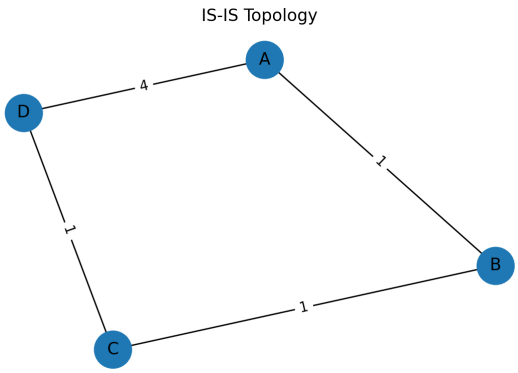
Router: R1

R1	AS-PATH: 0 R1
R2	AS-PATH: 1 R2
R3	AS-PATH: 2 R2
R4	AS-PATH: 3 R2

BGP and IS-IS Results



BGP AS-level Topology



IS-IS Topology

Snapshot: bgp_tables.json

Router: AS1
192.0.2.0/24 AS-PATH: AS3 AS3 AS2
10.0.0.0/24 AS-PATH: AS4 AS4 AS2

Snapshot: isis_tables.json

Router: A
A AS-PATH: 0 A
B AS-PATH: 1 B
C AS-PATH: 2 B
D AS-PATH: 3 B

Observations & Comparison

RIP: Simple distance-vector; iterative updates until convergence. Slower convergence and higher message overhead for large networks. OSPF/IS-IS: Link-state protocols; each router builds full topology via LSAs and runs Dijkstra. Faster convergence, scalable, more overhead in flooding LSAs. BGP: Path-vector at AS-level. Routes selected by AS-PATH length here; loop prevention done by AS-PATH checks. Convergence depends on policy and AS relationships.