# AutoRouteOps – Intelligent Routing Protocol Dashboard

Network Operation & Management Project Report

Team Members:

* Mustafa Sayed Ibrahim – ID: 230200003
* Abdulazim Alaa Abdulazim – ID: 230200005
* Shaimaa Sayed – ID: 230105872
* Menna Allah Eid AbdElRahman – ID: 230105180
* Eman Hesham Soliman – ID: 230103682

## Abstract

This project, AutoRouteOps, presents an intelligent routing protocol dashboard designed for regional ISPs. It visualizes dynamic routing behavior in real time, aiding network administrators in fault analysis, performance monitoring, and protocol optimization.

## 1. Introduction

Network reliability and dynamic routing management are critical to modern ISPs. AutoRouteOps is a Python-based tool that integrates with Cisco Packet Tracer to visualize routing behavior (OSPF, EIGRP, RIP) and issue real-time alerts for network anomalies, thereby enhancing operational efficiency.

## 2. System Architecture

The architecture consists of three layers: the simulation layer (Packet Tracer), data extraction and automation layer (Python backend), and the user interface layer (Tkinter).

## 3. Design and Implementation

The network topology spans multiple simulated cities using Packet Tracer. Routing tables and status updates are automatically retrieved via a Python script. Users can select files and monitor protocol behavior via a Tkinter GUI.

* Key Python Libraries Used:
* • os
* • tkinter
* • ttk (from tkinter)

## 4. Routing Protocols Overview

The project supports OSPF, EIGRP, and RIP routing protocols. Each protocol is visualized and compared for convergence speed, failover handling, and routing behavior under simulated failure conditions.

## 5. Testing and Results

The system was tested under normal and failure scenarios. Results confirmed proper alerting, accurate routing table retrieval, and measurable convergence delays. Failover logic was validated using Packet Tracer simulations.

## 6. Code Quality and Documentation

The codebase follows modular design principles. It uses structured exception handling, reusable components, and includes detailed docstrings and README documentation.

## 7. Challenges and Future Enhancements

Key challenges included integrating simulation output with a GUI and managing real-time data parsing. Future work could include adding protocol analytics, SNMP support, and cloud-hosted dashboards.

## 8. Conclusion

AutoRouteOps successfully demonstrates an integrated routing visualization system for ISPs. It provides practical insights into dynamic routing behavior and supports network reliability through simulation-driven testing.

## 9. References

• Cisco Packet Tracer – https://www.netacad.com/courses/packet-tracer

• Python Tkinter Documentation – https://docs.python.org/3/library/tk.html

• Routing Protocols Overview – https://www.cloudflare.com/learning/network-layer/what-is-a-routing-protocol/