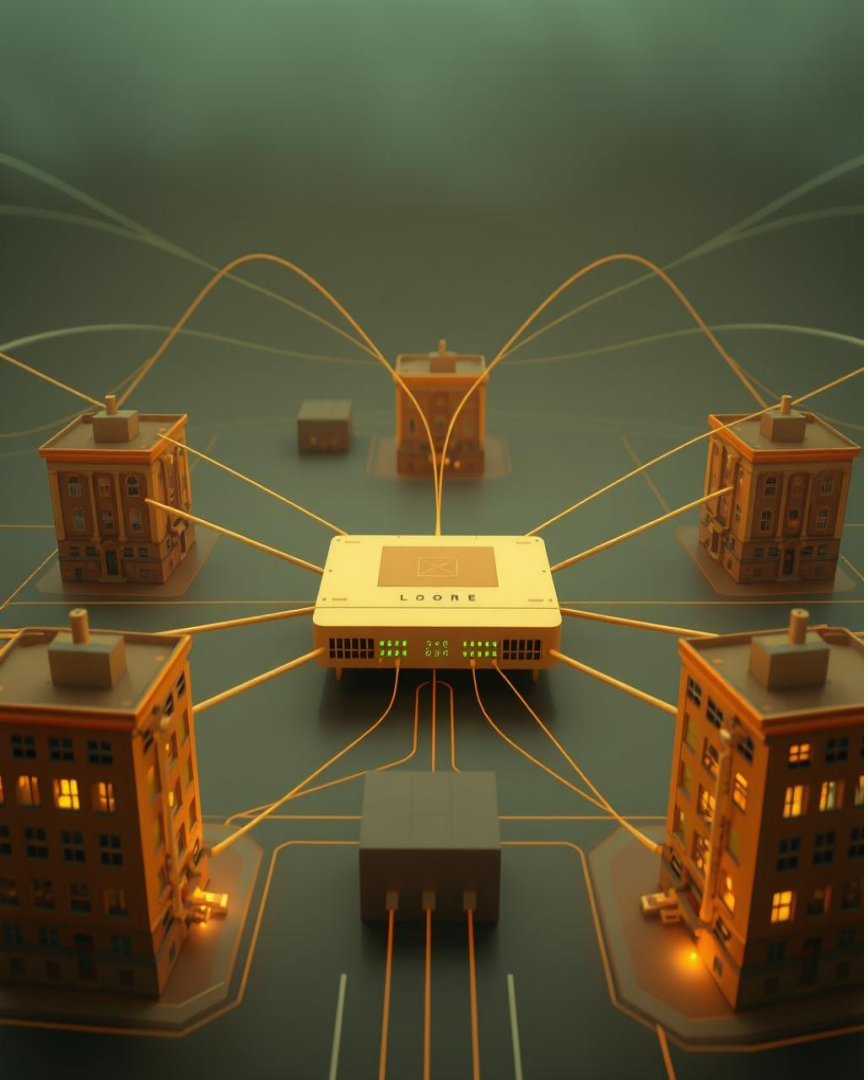

RUET Campus Network

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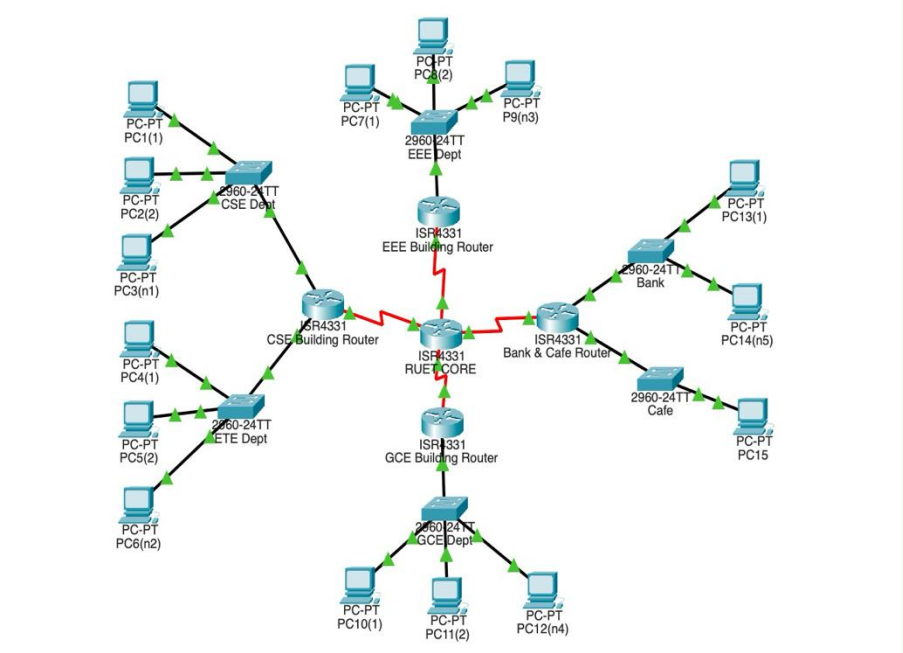
Campus Network Overview

A campus network connects all buildings and departments in a university so everyone can share the internet and digital resources.



- RUET-CORE connects CSE, EEE, GCE, Cafe & Bank
- Each department has its own router & switch connecting local PCs
- Static routing within departments provides predictable communication
- Dynamic RIP links buildings with automatic updates & link recovery
- Hybrid design ensures seamless internet, data sharing & admin access

Routing Basics

Routing selects the best path for data packets so information reaches its destination accurately and efficiently.

Static Routing

- Remote networks are **manually configured**
- Ideal for small, predictable networks (e.g. departments)
- Highly stable and Secure
- **Low CPU & Bandwith** usage

Dynamic Routing

- Only directly connected networks are manually configured
- Uses the **Bellman–Ford algorithm** for Distance-Vector **and Dijkstra algorithm** for Link-State routing protocol
- Broadcast updates every **30 seconds** (RIPv1)
- **Ideal for large networks**, but higher CPU & bandwidth usage

Static Routing: Types

Standard Static Routing

Defines a path to a specific network; used for known destinations and direct links.

Default Static Routing

Catch-all path for unknown destinations; forwards all unmatched traffic to a default gateway (0.0.0.0/0).

Summary Static Routing

Combines multiple contiguous routes into one to reduce routing table size, saving memory and CPU.

Floating Static Routing

Backup route with a higher administrative distance; activates when the primary route fails, ensuring failover.

Dynamic Routing: Types

Distance-Vector Protocols

RIP, IGRP (Based on Hop Count)

Link-State Protocols

OSPF, IS-IS (Based on Link Cost)

Ethical & Operational Considerations

Fair Access

- Equal bandwidth & reliability for students, faculty & staff
- Avoid throttling or prioritising select users
- Ensuring consistent network performance

Risks if Misconfigured

- Downtime from incorrect routes disconnects departments
- Misrouted packets may expose sensitive data
- Unchecked admin rights can be abused

Societal Impact

Student Experience

Fast, reliable access to learning resources, lectures & online exams depends on efficient routing.

Faculty & Admin

Departments rely on shared services (academic portals, file servers); routing misconfigurations can disrupt productivity.

Campus Services

Cafe, bank & other services require stable connectivity for transactions & supplies.

Real-World Effects and Risks

Exam System Downtime

If RIP updates fail or a static route is broken, students cannot access online exam portals — disrupting assessments and delaying grading.

Administrative Delays

The administration and finance departments (connected through the core router and bank) face interruptions in payroll processing or fee transactions.

Academic Resource Inaccessibility

Faculty lose access to shared research data or departmental drives, halting collaborative projects and lab operations.

Campus-Wide Productivity Loss

Misrouted traffic increases helpdesk tickets, wastes teaching hours, and reduces trust in the university’s digital infrastructure.

Environmental Considerations

Protocol / Area	CPU Load	Energy Use	Example
Static (CSE, EEE, GCE)	Low	Low	Fixed routes → no periodic updates
Dynamic RIP (Ruet Core ↔ Cafe/Bank)	Moderate – High	Higher	Core router sends updates every 30 s

Energy-Efficient Practices

- Optimize routing tables to reduce CPU overhead
- Disable unused switch ports in labs after hours
- Extend RIP update intervals where possible
- Deploy modern, low-power routers for inter-building links

Green energy for a sustainable campus network

Best Practices & Solutions

Monitor & Audit

Regularly check routing tables and logs to detect misconfigurations or unauthorized changes.

Redundancy

Implement backup links and redundant routers to prevent outages during failures.

Optimize Updates

Tune RIP timers and disable unused ports to balance convergence speed with energy efficiency.

Educate Admins

Train network staff on ethical routing principles and security best practices.

Comparison of Routing Approaches

Aspects	Static	Floating	RIP
Reliability	High if configured	Medium	High (Converges)
Ease of Setup	Manual	Semi-automatic	Automatic
Energy Use	Low	Medium	Higher
Scalability	Poor	Moderate	Good

Winner for RUET: Hybrid mix!

Conclusion & Recommendations

Ethical Commitment

Ensure transparent & fair network access for all users.

Hybrid Performance

Static + RIP design balances simplicity with scalability & resilience.

Societal Responsibility

Keep the academic system running smoothly.

Final Recommendations for RUET Networking

- **Redundancy:** Implement physical & logical redundant links for vital connections.
- **Auditing:** Routinely review all configurations and security logs.
- **Model Maintenance:** Continue to maintain the hybrid routing model—simple, reliable, fair & sustainable for RUET's evolving needs.

THANK YOU

ANY QUESTION ??