Problem Statement: **Evaluation of Routing Protocols in a Simulated Network**
Team Leads: Carter Reis, Rutuja Atul Potdar
Team Members: Dan Wager, An Dang

Roles:
Carter Reis and Dan Wager: Implementation of RIP, creating summary and readme.
Rutuja Potdar and An Dang: Implementation of STP, RSTP, creating summary and readme.

3 Minute Video: https://www.youtube.com/watch?v=MCOwCoYdBCs
GitHub: https://github.com/AnDang27/Data-Comm-Routing

Our problem revolved around evaluating the performance of distance-vector routing and spanning tree routing protocols in a simulated network environment. To achieve this task, we used a network simulator called Cisco Packet Tracer. The decision to use this simulation software was largely due in part to the wide availability of resources, such as youtube videos, in order to quickly learn the basics of what the software has to offer. However, there was still a large learning curve to figuring out how to use the software, and how to demonstrate the behavior of different algorithms.

Once this bridge was crossed by referencing even more tutorials, we were able to construct several smaller scale networks, one that primarily used RIP(Routing Information Protocol) which uses Bellman-Ford and ones that used STP(Spanning Tree Protocol) or RSTP(Rapid Spanning Tree Protocol). These were useful in helping discover what our larger scale demo would look like and how to make it operate as we intend it to. After these smaller networks were understood, we created a much larger network shown by Figure 1 which contained 21 routers, 8 switches, and 7 end points(PCs). On this network we were able to display the functionality of RIP, STP, and RSTP. RIP was displayed by performing a "traceroute" which would show the hops that packets are taking from a source to a destination, then shutting down a link along that path while packets are still being transmitted and then seeing a new route has been found dynamically. STP and RSTP were shown similarly by disabling one of the links within the multi-switch system and seeing that the destination was unreachable then reachable shortly after once the new switch route was found. The convergence time of RSTP is very small compared to STP. When STP and RSTP were implemented on small networks all the end devices had almost the same convergence time however, when tried on larger networks the convergence time was different for each device. Also, by changing the cost of the link the selection of the path to send the data changes i.e. it takes the path with the shortest cost. Furthermore to prevent the network against misconfigurations or any intentional attempts to introduce new switches into the network the port guard is turned ON.
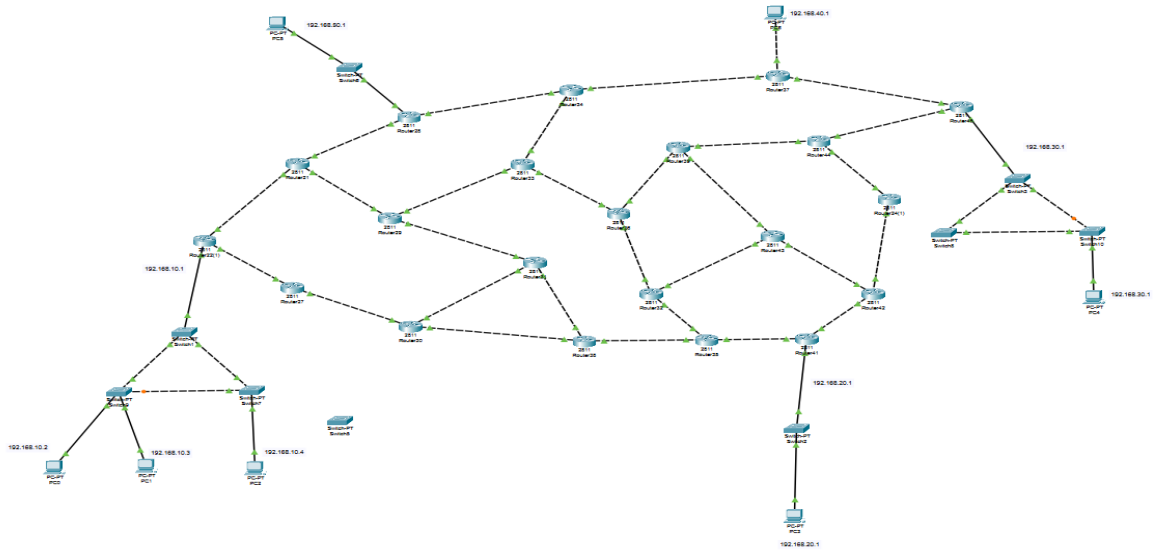
**Figure 1:** Routing Network Demo