Question 4 Design Doc

https://github.com/BellamyDev/Software-Defined-Networking-Controller/tree/main

To design this routing system with visual aspects, I first decided to use networkx as the baseline for networking. The library includes many functions that help make it easier to organize nodes for graphs and designs. To find the shortest path I used their built in algorithm. Their algorithm uses Dijkstra’s algorithm which is commonly used when finding the shortest path in nodes. The add\_rule function simply finds the primary path and also create a flow table when you give it a list of nodes and the match of the source and destination. The program flow builds the flow by finding k\_paths to get the path, then it builds the match dictionary while tagging vip parts with the priority. After this, it sends it to the add rule to add it as a rule. Recompute will clear the table and recompute the paths.

After the helper functions, the main functions are for the parts to be added and given to the user. The draw function was the hardest function I made, but I will show the process of making it after. The add link and node functions simply used network functions to add them to the graph. The fail link removes an edge between the two nodes in a graph. Do\_send calls helper functions to record the flow, mark critical parts, and install switch rules. Do\_show is the printing portion of the program. It will print the flows and the flow table, then it calls draw to draw the visuals for the user. Help simply shows the help commands. Repl is the main loop that will prompt the user for commands and run these commands. Shlex was used to give a more command line approach and made it easier to use parsing logic. I used my watermark as the window name for my visual.

I had the most trouble with displaying my visual component. It was not easy to show the information needed as there had to be calculations on each edge and I had trouble showing backup routes. In my first implementation, the line would simply break on a link failure even though my flow table showed the other path.

A computer code with text on it

Description automatically generatedA screenshot of a computer

Description automatically generated

I then changed the way it was rendered and fixed the issue of the link loads not adding when it wasn’t a direct connection.

A line with blue dots and letters

Description automatically generatedA computer screen shot of a program

Description automatically generated

At the end I added a legend and colors to show the difference between primary and backup paths. I also added my watermark being used in the title of the window.A screen shot of a computer program

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