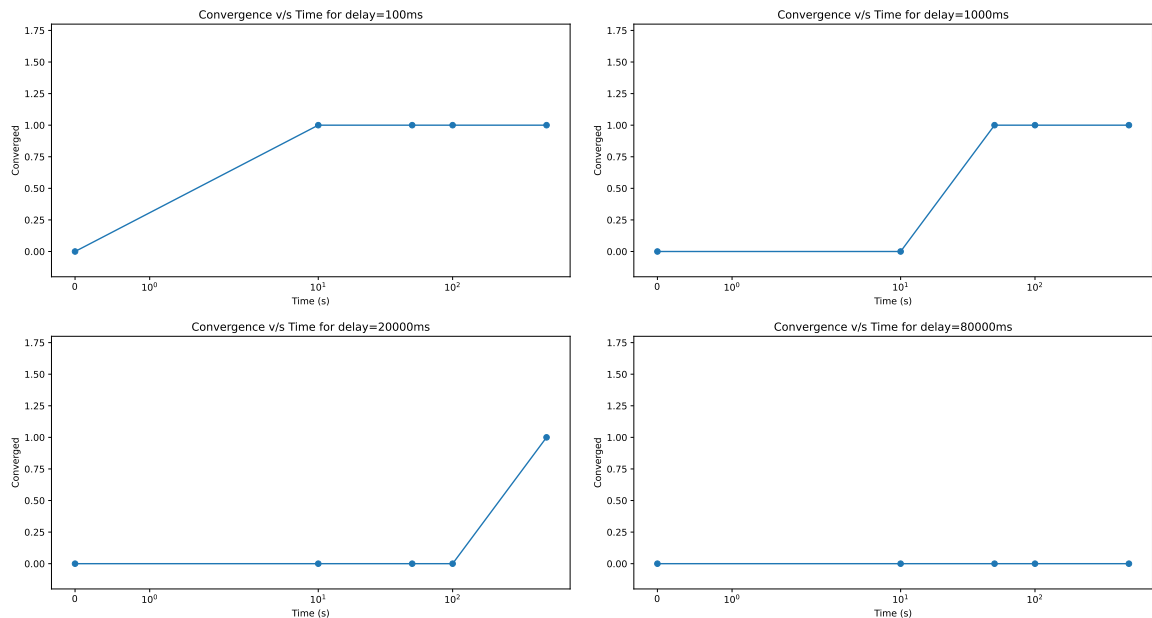# COL334 Assignment 4 Part B

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(i) Routing Table Convergence

(a) The plots are as follows:

(b) We see that for small delays, the routers converge quickly, while for the 20 second delay, the routers converge only after a long time, and for the 80 second delay, they do not converge at all.

(ii) Link severing simulation

(a) At T=121 seconds, we have the following tables:

Router 1

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
10.0.0.0	0.0.0.0	255.255.255.0	U	1	-	-	1

Router 2

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
10.0.4.0	10.0.2.2	255.255.255.0	UGS	2	-	-	2
10.0.3.0	10.0.2.2	255.255.255.0	UGS	2	-	-	2
10.0.0.0	10.0.2.2	255.255.255.0	UGS	3	-	-	2
10.0.2.0	0.0.0.0	255.255.255.0	U	1	-	-	2

Router 3

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
10.0.1.0	10.0.2.1	255.255.255.0	UGS	16	-	-	1
10.0.2.0	0.0.0.0	255.255.255.0	U	1	-	-	1
10.0.4.0	0.0.0.0	255.255.255.0	U	1	-	-	3

At T=180 seconds, we have the following tables:

Router 1

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
10.0.0.0	0.0.0.0	255.255.255.0	U	1	-	-	1

Router 2

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
10.0.4.0	10.0.2.2	255.255.255.0	UGS	2	-	-	2
10.0.2.0	0.0.0.0	255.255.255.0	U	1	-	-	2

Router 3

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
10.0.1.0	10.0.2.1	255.255.255.0	UGS	16	-	-	1
10.0.2.0	0.0.0.0	255.255.255.0	U	1	-	-	1
10.0.4.0	0.0.0.0	255.255.255.0	U	1	-	-	3

(b) The Reachability graph is as follows:
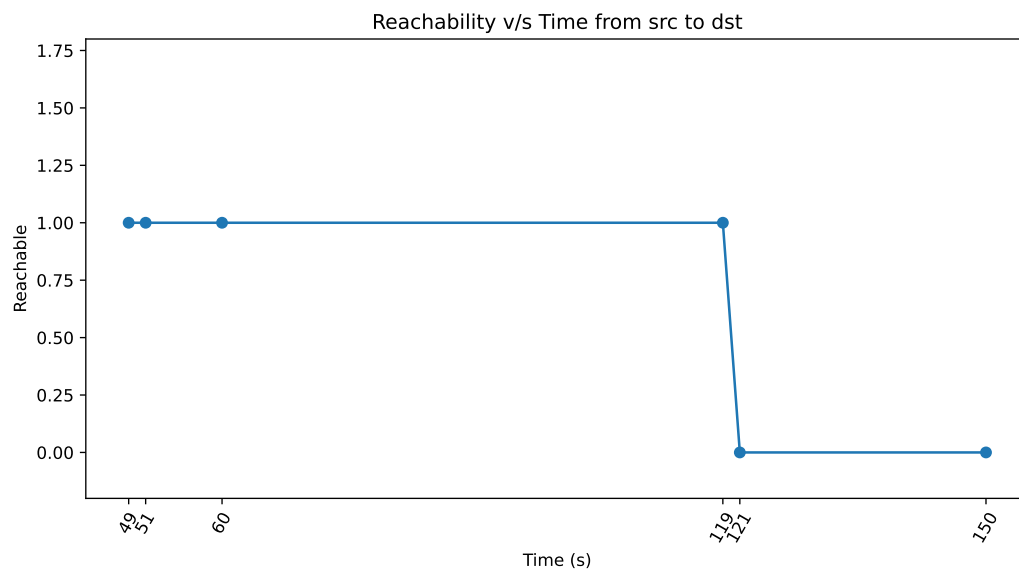
(c) At T=51 seconds, the path packets take is src → R1 → R3 → dest. The same path is taken at T=119 s, as the link is not yet severed. At T=120 s, however, the R1 → R3 link is severed and we see that the destination node is not reachable at T=121 seconds, as there are no paths to it (the link from R1 to R2 and R1 to R3 both have been severed).

(iii) Link Reappearing Simulation

(a) At T=70 seconds, we have the following tables:

Router 1

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
10.0.0.0	0.0.0.0	255.255.255.0	U	1	-	-	1

Router 2

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
10.0.4.0	10.0.2.2	255.255.255.0	UGS	2	-	-	2
10.0.2.0	0.0.0.0	255.255.255.0	U	1	-	-	2

Router 3

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
10.0.2.0	0.0.0.0	255.255.255.0	U	1	-	-	1
10.0.4.0	0.0.0.0	255.255.255.0	U	1	-	-	3

At T=180 seconds, we have the following tables:

Router 1

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
10.0.4.0	10.0.3.2	255.255.255.0	UGS	2	-	-	3
10.0.2.0	10.0.1.2	255.255.255.0	UGS	2	-	-	2
10.0.0.0	0.0.0.0	255.255.255.0	U	1	-	-	1
10.0.1.0	0.0.0.0	255.255.255.0	U	1	-	-	2
10.0.3.0	0.0.0.0	255.255.255.0	U	1	-	-	3

Router 2

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
10.0.4.0	10.0.2.2	255.255.255.0	UGS	2	-	-	2
10.0.3.0	10.0.1.1	255.255.255.0	UGS	2	-	-	1
10.0.0.0	10.0.1.1	255.255.255.0	UGS	2	-	-	1
10.0.1.0	10.0.2.2	255.255.255.0	UGS	3	-	-	2
10.0.2.0	0.0.0.0	255.255.255.0	U	1	-	-	2
10.0.1.0	0.0.0.0	255.255.255.0	U	1	-	-	1

Router 3

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
10.0.1.0	10.0.3.1	255.255.255.0	UGS	2	-	-	2
10.0.0.0	10.0.3.1	255.255.255.0	UGS	2	-	-	2
10.0.2.0	0.0.0.0	255.255.255.0	U	1	-	-	1
10.0.3.0	10.0.2.1	255.255.255.0	UGS	3	-	-	1
10.0.4.0	0.0.0.0	255.255.255.0	U	1	-	-	3
10.0.3.0	0.0.0.0	255.255.255.0	U	1	-	-	2

(b) The Reachability graph is as follows:

Reachability v/s Time from src to dst
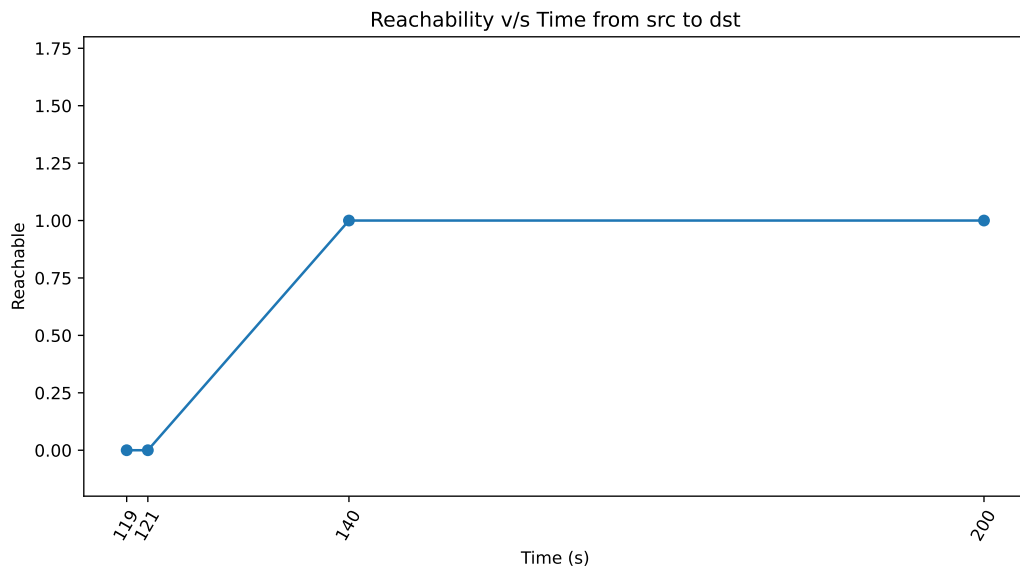
(c) The destination node is reachable after T=140 seconds, as the links to it have been reestablished at T=120 seconds. The reachability does not immediately change after the link has been reestablished, eg. at T=121 seconds, as the routing tables take time to update.

Appendix

All files are as specified in the submission instructions. The rip-simple-network file was modified to create the connection and the simulation. The script saves the routing tables to the respective files, and the plotting was done using a Jupyter notebook and matplotlib (which has been attached, both as a notebook and as a script). The data files generated after the run are in the data directory. Note that the reachability and convergence CSV files were generated by hand after going through the routing tables that were printed to file.