COL 334 Assignment-4 3-11-2022

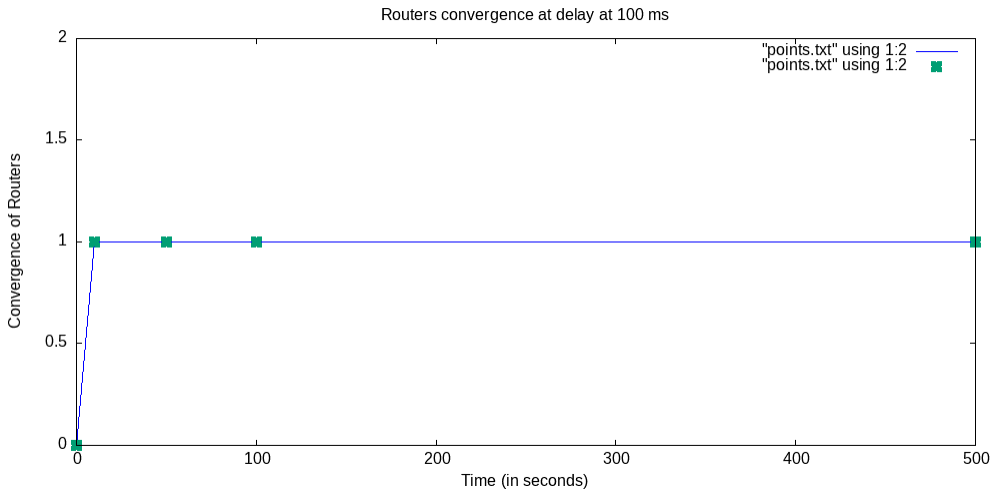
Madaka Jaya Prakash 2020CS10356

1 Part B:

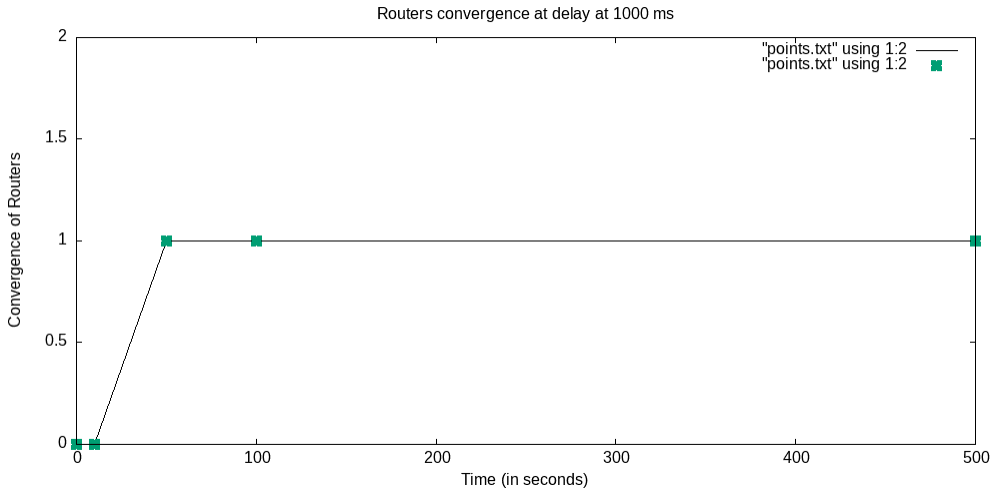
1.1

a :

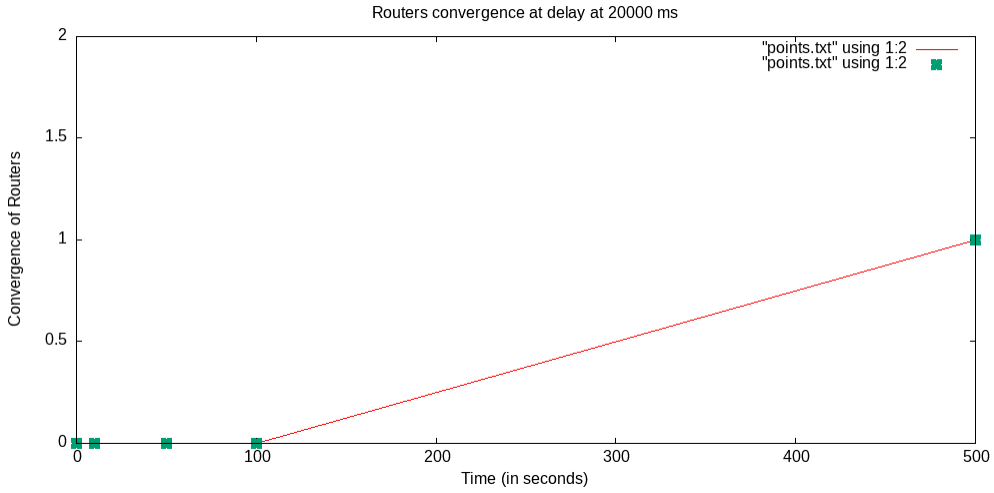
The Simulation with routers R1,R2,R3 with metric values 1 with following delays are made to run and the following graphs are generated.



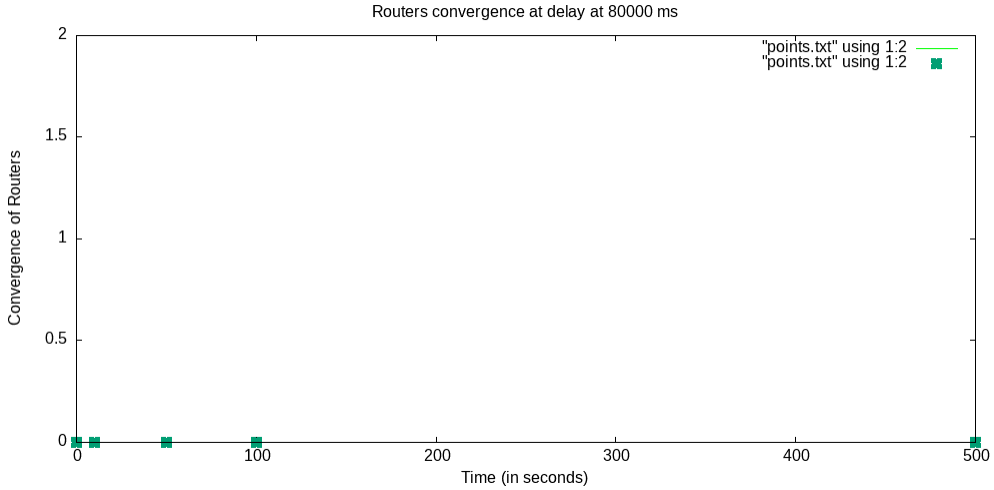
Convergence Graph for CSMA delay 100 ms



Convergence Graph for CSMA delay 1000 ms



Convergence Graph for CSMA delay 20000 ms



Convergence Graph for CSMA delay 80000 ms

b :

As we can see when the delay of chanel is decreasing then the routers converge more quickly.
The Routing Information Protocol next generation (RIPng) is an interior gateway protocol (IGP) that uses a distance-vector algorithm to determine the best route to a destination, using hop count as the metric.
As RIPng Routers uses distance-vector algorithm , The convergence time varies with channel delay rate and also it is a count-to-infinty problem.
In distance-vectore-algorithm the routers pass the information of their routing tables to their neighbors when they are updated.
If the channel delay increases the routers take more time to recieve the information from other routers which takes more time to converge.

1.2

a : Now the link between R1 and R2 goes down at t=50sec and The link between R1 and R3 goes down at t=120 sec.

Routing Table for R1 at t=121 sec.

```
Node: 2, Time: +121.0s, Local time: +121.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 2, Time: +121.0s, Local time: +121.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.0.0        0.0.0.0         255.255.255.0   U     1      -      -   1
```

Routing Table for R2 at t=121 sec.

```
Node: 3, Time: +121.0s, Local time: +121.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 3, Time: +121.0s, Local time: +121.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.4.0        10.0.3.2        255.255.255.0   UGS   2      -      -   2
10.0.2.0        10.0.3.2        255.255.255.0   UGS   2      -      -   2
10.0.0.0        10.0.3.2        255.255.255.0   UGS   3      -      -   2
10.0.3.0        0.0.0.0         255.255.255.0   U     1      -      -   2
```

Routing Table for R3 at t=121 sec.

```
Node: 4, Time: +121.0s, Local time: +121.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 4, Time: +121.0s, Local time: +121.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.1.0        10.0.3.1        255.255.255.0   UGS   16     -      -   2
10.0.3.0        0.0.0.0         255.255.255.0   U     1      -      -   2
10.0.4.0        0.0.0.0         255.255.255.0   U     1      -      -   3
```

Routing Table for R1 at t=180 sec.

```
Node: 2, Time: +180.0s, Local time: +180.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 2, Time: +180.0s, Local time: +180.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.0.0        0.0.0.0         255.255.255.0   U     1      -      -   1
```

Routing Table for R2 at t=180 sec.

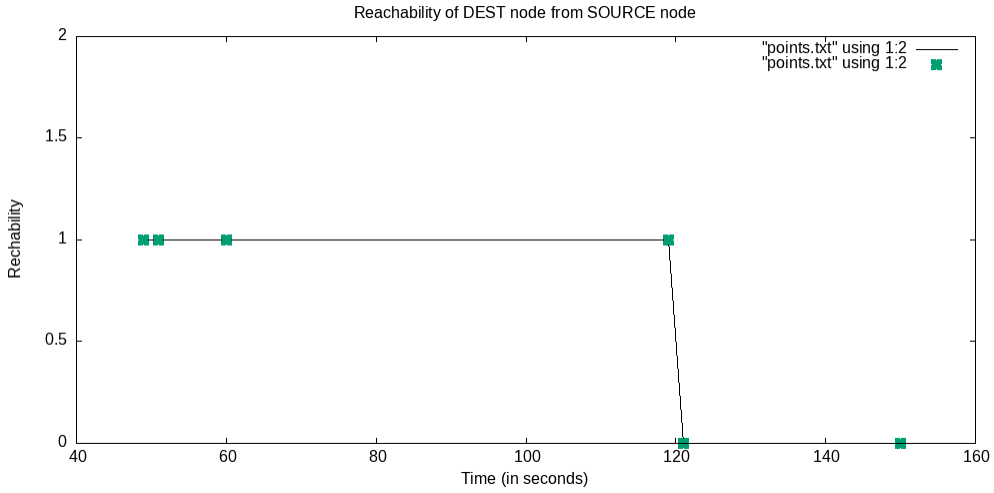
```
Node: 3, Time: +180.0s, Local time: +180.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 3, Time: +180.0s, Local time: +180.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.4.0        10.0.3.2        255.255.255.0   UGS   2      -      -   2
10.0.3.0        0.0.0.0         255.255.255.0   U     1      -      -   2
```

Routing Table for R3 at t=180 sec.

```
Node: 4, Time: +180.0s, Local time: +180.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 4, Time: +180.0s, Local time: +180.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.1.0        10.0.3.1        255.255.255.0   UGS   16     -      -   2
10.0.3.0        0.0.0.0         255.255.255.0   U     1      -      -   2
10.0.4.0        0.0.0.0         255.255.255.0   U     1      -      -   3
```

b :

Rechability of DEST node from SOURCE node.



c :

At t=51 sec and at t=119 , Dest node is Rechabale from source Node but at t=121 sec the Dest node is not rechable form dource node we can see in the routing table of R1 it cannot send packets to any of the other routers R2,R3 as the both links are down at 120 sec.
At t=50 sec the link between R1 and R2 is down so all the packets through dest must pass through R3 router.
which indeed is the less cost route from source to destination although the next link R1 and R3 is down at 120 sec so, the rechability at t=51 sec and
at t=119 sec are similar.
Since the delay channel is less (2ms) routers can converge at 51 sec.
But at t=121 sec as the both links from R1 to routers are down , the router R1 cannot send packets to other routers which we can see at 121 sec Routing table at R1 is single entry and even at t=180 sec.

1.3

a : Now the link between R1 and R2 and link between R1 and R3 goes down at 50 sec and comes up at 120 sec.

Routing Table for R1 at t=70 sec

```
Node: 2, Time: +70.0s, Local time: +70.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 2, Time: +70.0s, Local time: +70.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.0.0        0.0.0.0         255.255.255.0   U     1      -      -   1
```

Routing Table for R2 at t=70 sec

```
Node: 3, Time: +70.0s, Local time: +70.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 3, Time: +70.0s, Local time: +70.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.4.0        10.0.3.2        255.255.255.0   UGS   2      -      -   2
10.0.3.0        0.0.0.0         255.255.255.0   U     1      -      -   2
```

Routing Table for R3 at t=70 sec

```
Node: 4, Time: +70.0s, Local time: +70.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 4, Time: +70.0s, Local time: +70.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.3.0        0.0.0.0         255.255.255.0   U     1      -      -   2
10.0.4.0        0.0.0.0         255.255.255.0   U     1      -      -   3
```

Routing Table for R1 at t=180 sec

```
Node: 2, Time: +180.0s, Local time: +180.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 2, Time: +180.0s, Local time: +180.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.4.0        10.0.2.2        255.255.255.0   UGS   2      -      -   3
10.0.3.0        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
10.0.2.0        0.0.0.0         255.255.255.0   U     1      -      -   3
```

Routing Table for R2 at t=180 sec

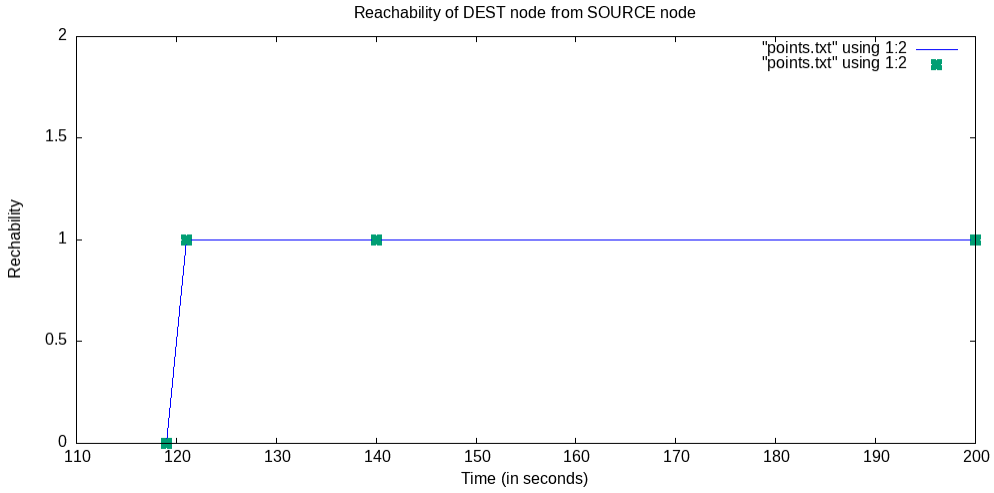
```
Node: 3, Time: +180.0s, Local time: +180.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 3, Time: +180.0s, Local time: +180.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.4.0        10.0.3.2        255.255.255.0   UGS   2      -      -   2
10.0.2.0        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        10.0.3.2        255.255.255.0   UGS   3      -      -   2
10.0.3.0        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
```

Routing Table for R3 at t=180 sec

```
Node: 4, Time: +180.0s, Local time: +180.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 4, Time: +180.0s, Local time: +180.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.1.0        10.0.2.1        255.255.255.0   UGS   2      -      -   1
10.0.0.0        10.0.2.1        255.255.255.0   UGS   2      -      -   1
10.0.2.0        10.0.3.1        255.255.255.0   UGS   3      -      -   2
10.0.3.0        0.0.0.0         255.255.255.0   U     1      -      -   2
10.0.4.0        0.0.0.0         255.255.255.0   U     1      -      -   3
10.0.2.0        0.0.0.0         255.255.255.0   U     1      -      -   1
```

b :

Rechability of DEST node from SOURCE node



taskB.cc was the file in which the code was written for the configuration. All the plots were generated using gnuplot and routing tables are printed through code as referenced by base file given, the corresponding photos were attached and also the nodes were labelled for respective picture.