# **ASSIGNMENT-3**

Ans 1) a) network topology is created with routers from: R1-R6.

Cost of the link is changed to : 5.

```
yash@LAPTOP-JSHLQ768:/mnt/c/Users/YASH KANOJIA/Desktop/cn/A4/tarball/ns-allinone-3.31/ns-3.31$ ./waf --run "scratch/topology --printRoutingTables
Waf: Entering directory `/mnt/c/Users/YASH KANOJIA/Desktop/cn/A4/tarball/ns-allinone-3.31/ns-3.31/build'
[2793/2843] Compiling scratch/topology.cc
[2804/2843] Linking build/scratch/topology
Waf: Leaving directory `/mnt/c/Users/YASH KANOJIA/Desktop/cn/A4/tarball/ns-allinone-3.31/ns-3.31/build'
Build commands will be stored in build/compile_commands.json
'build' finished successfully (18.381s)
PING 10.0.16.4 - 1024 bytes of data - 1052 bytes including ICMP and IPv4 headers.
```

```
ripRouting.ExcludeInterface (R0,2);

174 ripRouting.SetInterfaceMetric (R3, 3, 5);

175 ripRouting.SetInterfaceMetric (R4, 4, 5);

176
```

b)

```
NS_LOG_INFO ("Assign IPv4 Addresses.");
Ipv4AddressHelper ipv4;
ipv4.SetBase (Ipv4Address ("10.0.0.0"), Ipv4Mask ("255.255.255.0"));
Ipv4InterfaceContainer iic1 = ipv4.Assign (ndc1);
ipv4.SetBase (Ipv4Address ("10.0.1.0"), Ipv4Mask ("255.255.255.0"));
Ipv4InterfaceContainer iic2 = ipv4.Assign (ndc2);
ipv4.SetBase (Ipv4Address ("10.0.2.0"), Ipv4Mask ("255.255.255.0"));
Ipv4InterfaceContainer iic3 = ipv4.Assign (ndc3);
ipv4.SetBase (Ipv4Address ("10.0.3.0"), Ipv4Mask ("255.255.255.0"));
Ipv4InterfaceContainer iic4 = ipv4.Assign (ndc4);
ipv4.SetBase (Ipv4Address ("10.0.4.0"), Ipv4Mask ("255.255.255.0"));
Ipv4InterfaceContainer iic5 = ipv4.Assign (ndc5);
ipv4.SetBase (Ipv4Address ("10.0.5.0"), Ipv4Mask ("255.255.255.0"));
Ipv4InterfaceContainer iic6 = ipv4.Assign (ndc6);
ipv4.SetBase (Ipv4Address ("10.0.6.0"), Ipv4Mask ("255.255.255.0"));
Ipv4InterfaceContainer iic7 = ipv4.Assign (ndc7);
ipv4.SetBase (Ipv4Address ("10.0.7.0"), Ipv4Mask ("255.255.255.0"));
Ipv4InterfaceContainer iic8 = ipv4.Assign (ndc8);
ipv4.SetBase (Ipv4Address ("10.0.8.0"), Ipv4Mask ("255.255.255.0"));
Ipv4InterfaceContainer iic9= ipv4.Assign (ndc9);
ipv4.SetBase (Ipv4Address ("10.0.9.0"), Ipv4Mask ("255.255.255.0"));
Ipv4InterfaceContainer iic10 = ipv4.Assign (ndc10);
ipv4.SetBase (Ipv4Address ("10.0.10.0"), Ipv4Mask ("255.255.255.0"));
Ipv4InterfaceContainer iic11 = ipv4.Assign (ndc11);
ipv4.SetBase (Ipv4Address ("10.0.11.0"), Ipv4Mask ("255.255.255.0"));
Ipv4InterfaceContainer iic12 = ipv4.Assign (ndc12);
ipv4.SetBase (Ipv4Address ("10.0.12.0"), Ipv4Mask ("255.255.255.0"));
Ipv4InterfaceContainer iic13 = ipv4.Assign (ndc13);
```

```
(verbose)
    LogComponentEnableAll (LogLevel (LOG_PREFIX_TIME | LOG_PREFIX_NODE));
    LogComponentEnable ("RipSimpleRouting", LOG_LEVEL_INFO);
    LogComponentEnable ("Rip", LOG_LEVEL_ALL);
    LogComponentEnable ("Ipv4Interface", LOG_LEVEL_ALL);
    LogComponentEnable ("Icmpv4L4Protocol", LOG_LEVEL_ALL);
    LogComponentEnable ("Ipv4L3Protocol", LOG_LEVEL_ALL);
    LogComponentEnable ("ArpCache", LOG_LEVEL_ALL);
    LogComponentEnable ("V4Ping", LOG_LEVEL_ALL);
if (SplitHorizon == "NoSplitHorizon")
    Config::SetDefault ("ns3::Rip::SplitHorizon", EnumValue (RipNg::NO_SPLIT_HORIZON));
else if (SplitHorizon == "SplitHorizon")
    Config::SetDefault ("ns3::Rip::SplitHorizon", EnumValue (RipNg::SPLIT_HORIZON));
    Config::SetDefault ("ns3::Rip::SplitHorizon", EnumValue (RipNg::POISON_REVERSE));
void TearDownLink (Ptr<Node> nodeA, Ptr<Node> nodeB, uint32_t interfaceA, uint32_t interfaceB)
  nodeA->GetObject<Ipv4> ()->SetDown (interfaceA);
  nodeB->GetObject<Ipv4> ()->SetDown (interfaceB);
```

Simulator::Schedule (Seconds (25), &TearDownLink, R3, R4, 3, 2);

```
d) a to k:
                               255.255.255.0
10.0.2.0
                                                    4
                10.0.15.1
                               255.255.255.0
                                               UGS
10.0.1.0
                               255.255.255.0
               10.0.15.1
                                               UGS
10.0.0.0
                               255.255.255.0
               10.0.15.1
                                               UGS
10.0.11.0
                              255.255.255.0
                                               UGS
                                                    3
               10.0.15.1
                              255.255.255.0
10.0.13.0
               10.0.15.1
                                               UGS
                              255.255.255.0
10.0.16.0
               10.0.15.1
                                               UGS
                              255.255.255.0
10.0.14.0
               10.0.15.1
                                               UGS
                              255.255.255.0
10.0.12.0
               10.0.15.1
                                               UGS
                                                    2
10.0.9.0
               0.0.0.0
                              255.255.255.0
                                              U
                                                    1
                                                                      1
10.0.10.0
               0.0.0.0
                              255.255.255.0
                                                                      2
                                              U
                                                    1
10.0.15.0
               0.0.0.0
                               255.255.255.0
                                                     1
                                                                      3
                                              U
--- 10.0.16.1 ping statistics ---
79 packets transmitted, 75 received, 5% packet loss, time 79000ms
rtt min/avg/max/mdev = 22/22/22/0 ms
```

## g to h:

TERMINAL	PROBLEMS 14 OUTPUT	DEBUG CONSOLE				
10.0.8.0	10.0.15.1	255.255.255.0	UGS	3		3
10.0.7.0	10.0.15.1	255.255.255.0	UGS	3		3
10.0.2.0	10.0.15.1	255.255.255.0	UGS	4		3
10.0.1.0	10.0.15.1	255.255.255.0	UGS	4		3
10.0.0.0	10.0.15.1	255.255.255.0	UGS	4		3
10.0.11.0	10.0.15.1	255.255.255.0	UGS	3		3
10.0.13.0	10.0.15.1	255.255.255.0	UGS	3		3
10.0.16.0	10.0.15.1	255.255.255.0	UGS	2		3
10.0.14.0	10.0.15.1	255.255.255.0	UGS	2		3
10.0.12.0	10.0.15.1	255.255.255.0	UGS	2		3
10.0.9.0	0.0.0.0	255.255.255.0	U	1		1
10.0.10.0	0.0.0.0	255.255.255.0	U	1		2
10.0.15.0	0.0.0.0	255.255.255.0	U	1		3
10.0.	10.0 ping statistics -					
	s transmitted, 0 recei		loss,	time	79000ms	

```
AsciiTraceHelper ascii;
csma.EnableAsciiAll (ascii.CreateFileStream ("rip-simple-routing.tr"));
csma.EnablePcapAll ("rip-simple-routing", true);

//Simulator::Schedule (Seconds (40), &TearDownLink, b, d, 3, 2);
//Simulator::Schedule (Seconds (25), &TearDownLink, R3, R4, 3, 2);

/* Now, do the actual simulation. */
NS_LOG_INFO ("Run Simulation.");
Simulator::Run ();
simulator::Stop(90);
Simulator::Destroy ();
NS_LOG_INFO ("Done.");
```

# **Tracing**

## Ans 2: a) a node:

icn	mpl													
o.		Time	Source	Destination	Protocol	Length	Info							
ai.	11	4.793885	10.0.0.1	10.0.16.1	ICMP	1070	Echo	(ping)	request	id=0x0000,	seq=4/1024,	tt1=64	(no response	found!)
	12	4.816157	10.0.16.1	10.0.0.1	ICMP	1070	Echo	(ping)	reply	id=0x0000,	seq=4/1024,	ttl=62		
	13	5.793885	10.0.0.1	10.0.16.1	ICMP	1070	Echo	(ping)	request	id=0x0000,	seq=5/1280,	ttl=64	(no response	found!)
	14	5.816157	10.0.16.1	10.0.0.1	ICMP	1070	Echo	(ping)	reply	id=0x0000,	seq=5/1280,	tt1=62		
	15	6.793885	10.0.0.1	10.0.16.1	ICMP	1070	Echo	(ping)	request	id=0x0000,	seq=6/1536,	tt1=64	(no response	found!)
	16	6.816157	10.0.16.1	10.0.0.1	ICMP	1070	Echo	(ping)	reply	id=0x0000,	seq=6/1536,	tt1=62		
	17	7.793885	10.0.0.1	10.0.16.1	ICMP	1070	Echo	(ping)	request	id=0x0000,	seq=7/1792,	ttl=64	(no response	found!)
	18	7.816157	10.0.16.1	10.0.0.1	ICMP	1070	Echo	(ping)	reply	id=0x0000,	seq=7/1792,	tt1=62		
	20	8.793885	10.0.0.1	10.0.16.1	ICMP	1070	Echo	(ping)	request	id=0x0000,	seq=8/2048,	tt1=64	(no response	found!)
	21	8.816157	10.0.16.1	10.0.0.1	ICMP	1070	Echo	(ping)	reply	id=0x0000,	seq=8/2048,	ttl=62		
	22	9.793885	10.0.0.1	10.0.16.1	ICMP	1070	Echo	(ping)	request	id=0x0000,	seq=9/2304,	ttl=64	(no response	found!)
	23	9.816157	10.0.16.1	10.0.0.1	ICMP	1070	Echo	(ping)	reply	id=0x0000,	seq=9/2304,	tt1=62		
	24	10.793885	10.0.0.1	10.0.16.1	ICMP	1070	Echo	(ping)	request	id=0x0000,	seq=10/2560	ttl=64	(no response	found!
		10.816157	10.0.16.1	10.0.0.1	ICMP	1070		(ping)	reply	id=0x0000,	seq=10/2560	A SAME AND		

## node g)



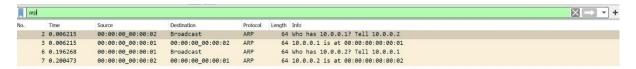
#### Node h)



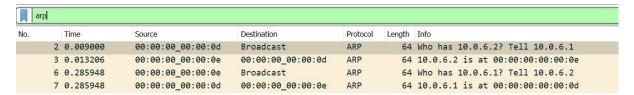
## Node k)



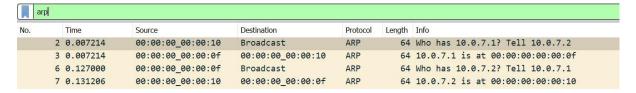
# b) node a):



#### Node g):



## Node h)



#### Node k)

arpl										
No.	Time	Source	Destination	Protocol	Length	Info				
	2 0.011214	00:00:00_00:00:16	Broadcast	ARP	64	Who has 10.0.10.1? Tell 10.0.10.2				
	3 0.011214	00:00:00_00:00:15	00:00:00_00:00:16	ARP	64	10.0.10.1 is at 00:00:00:00:00:15				
	6 0.059834	00:00:00_00:00:15	Broadcast	ARP	64	Who has 10.0.10.2? Tell 10.0.10.1				
	7 0.064039	00:00:00_00:00:16	00:00:00_00:00:15	ARP	64	10.0.10.2 is at 00:00:00:00:00:16				

c) routing tables at 10 s.

```
Node: 15, Time: +10.0s, Local time: +10.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 15, Time: +10.0s, Local time: +10.0s, IPv4 RIP table
Destination
                                                Flags Metric Ref
                Gateway
                                Genmask
                                                                     Use Iface
10.0.3.0
                10.0.16.1
                                255.255.255.0
                                                UGS
10.0.4.0
                10.0.16.1
                                255.255.255.0
                                                UGS
                                                                         4
10.0.5.0
                10.0.16.1
                                255.255.255.0
                                                UGS
10.0.6.0
                10.0.16.1
                                255.255.255.0
                                                UGS
                                                                         4
10.0.9.0
                10.0.16.1
                                255.255.255.0
                                                UGS
                                                                         4
10.0.10.0
                10.0.16.1
                                255.255.255.0
                                                UGS
                                                                         4
10.0.14.0
                10.0.13.1
                                255.255.255.0
                                               UGS
                                                      2
10.0.11.0
                10.0.13.1
                                255.255.255.0
                                                UGS
                                                                         3
10.0.0.0
                10.0.13.1
                                255.255.255.0
                                                UGS
                                                                         3
10.0.1.0
                10.0.13.1
                                255.255.255.0
                                                UGS
                                                                         3
10.0.2.0
                10.0.13.1
                                255.255.255.0
                                                UGS
                                                                         3
10.0.12.0
                10.0.16.1
                                255.255.255.0
                                                UGS
10.0.15.0
                10.0.16.1
                                255.255.255.0
                                                UGS
10.0.7.0
                0.0.0.0
                                255.255.255.0
                                                U
                                                                         1
10.0.8.0
                0.0.0.0
                                255.255.255.0
                                                                         2
10.0.13.0
                0.0.0.0
                                255.255.255.0
                                                U
10.0.16.0
                0.0.0.0
                                255.255.255.0
                                                U
                                                                         4
Node: 13, Time: +10.0s, Local time: +10.0s, Ipv4ListRouting table
 Priority: 0 Protocol: ns3::Rip
Node: 13, Time: +10.0s, Local time: +10.0s, IPv4 RIP table
Destination
               Gateway
                               Genmask
                                               Flags Metric Ref
                                                                    Use Iface
10.0.3.0
               10.0.14.2
                                255.255.255.0
                                               UGS
10.0.4.0
               10.0.14.2
                               255.255.255.0
                                               UGS
                                                                        3
10.0.5.0
               10.0.14.2
                               255.255.255.0
                                               UGS
                                                                        3
               10.0.14.2
10.0.6.0
                                255.255.255.0
                                               UGS
10.0.9.0
               10.0.14.2
                               255.255.255.0
                                               LIGS
                                                                        3
10.0.10.0
               10.0.14.2
                               255.255.255.0
                                               UGS
                                                                        3
10.0.8.0
               10.0.13.2
                               255.255.255.0
                                               LIGS
```

10.0.7.0 10.0.13.2 255.255.255.0 UGS 2 10.0.16.0 10.0.14.2 255,255,255.0 LIGS 3 10.0.14.2 255.255.255.0 UGS 10.0.15.0 10.0.12.0 10.0.14.2 255.255.255.0 UGS 3 10.0.2.0 10.0.11.1 255.255.255.0 UGS 1 10.0.11.1 10.0.1.0 255.255.255.0 UGS 10.0.0.0 10.0.11.1 255.255.255.0 UGS 255.255.255.0 10.0.11.0 0.0.0.0 10.0.13.0 0.0.0.0 255.255.255.0 2 0.0.0.0 255.255.255.0 10.0.14.0 3 1 Node: 11, Time: +10.0s, Local time: +10.0s, Ipv4ListRouting table Priority: 0 Protocol: ns3::Rip

Node: 11, Time: +10.0s, Local time: +10.0s, IPv4 RIP table Flags Metric Ref Gateway Destination Genmask Use Tface 10.0.10.0 10.0.11.2 255.255.255.0 UGS 4 4 10.0.9.0 10.0.11.2 255.255.255.0 UGS 10.0.6.0 10.0.11.2 255.255.255.0 UGS 4 4 10.0.5.0 10.0.11.2 255.255.255.0 UGS 4 4 10.0.4.0 10.0.11.2 255.255.255.0 UGS 4 10.0.3.0 10.0.11.2 255.255.255.0 UGS 4 10.0.14.0 10.0.11.2 255.255.255.0 UGS 4 10.0.13.0 10.0.11.2 255.255.255.0 UGS 255.255.255.0 UGS 4 10.0.12.0 10.0.11.2 10.0.15.0 10.0.11.2 255.255.255.0 UGS 4 10.0.16.0 10.0.11.2 255.255.255.0 UGS 10.0.7.0 4 10.0.11.2 255, 255, 255, 0 UGS 10.0.8.0 10.0.11.2 255.255.255.0 UGS 4 10.0.0.0 0.0.0.0 255.255.255.0 1 10.0.1.0 0.0.0.0 255.255.255.0 2 10.0.2.0 0.0.0.0 255.255.255.0 10.0.11.0 0.0.0.0 255.255.255.0

```
Node: 16, Time: +10.0s, Local time: +10.0s, Ipv4ListRouting table Priority: 0 Protocol: ns3::Rip
Node: 16, Time: +10.0s, Local time: +10.0s, IPv4 RIP table
                Gateway
                                                  Flags Metric Ref
Destination
                                                                        Use Tface
                                  Genmask
10.0.3.0
                 10.0.15.1
                                  255.255.255.0
                                                  UGS
10.0.4.0
                 10.0.15.1
                                  255.255.255.0
10.0.5.0
                 10.0.15.1
                                  255.255.255.0
                                                  UGS
                                                                            3
10.0.6.0
                 10.0.15.1
                                  255.255.255.0
                                                  UGS
                                                         3
                                                                            3
                 10.0.15.1
                                  255.255.255.0
                                                  UGS
10.0.8.0
                 10.0.15.1
                                  255.255.255.0
                                                  UGS
10.0.7.0
                                                                            3
                                  255.255.255.0
                 10.0.15.1
10.0.2.0
                                                  UGS
                                                         4
                                                                            3
                 10.0.15.1
10.0.1.0
                                  255.255.255.0
                                                  UGS
                                                                            3
10.0.0.0
                 10.0.15.1
                                  255.255.255.0
                                                  UGS
10.0.11.0
                 10.0.15.1
                                  255.255.255.0
                                                  UGS
                                                                            3
10.0.13.0
                 10.0.15.1
                                  255.255.255.0
                                                  UGS
                 10.0.15.1
                                                  UGS
10.0.16.0
                                  255.255.255.0
10.0.14.0
                 10.0.15.1
                                  255.255.255.0
                                                  UGS
                                                                            3
                                  255.255.255.0
10.0.12.0
                 10.0.15.1
                                                  UGS
                                                                            3
10.0.9.0
                 0.0.0.0
                                  255.255.255.0
10.0.10.0
                 0.0.0.0
                                  255.255.255.0
                                                         1
                                 255.255.255.0
10.0.15.0
                0.0.0.0
                                                                            3
```

```
Node: 14, Time: +10.0s, Local time: +10.0s, Ipv4ListRouting table
 Priority: 0 Protocol: ns3::Rip
Node: 14, Time: +10.0s, Local time: +10.0s, IPv4 RIP table
               Gateway
10.0.14.1
                                                Flags Metric Ref
Destination
                                Genmask
                                                                     Use Iface
                                255.255.255.0
10.0.13.0
                                                 UGS
10.0.11.0
                10.0.14.1
                                 255.255.255.0
10.0.0.0
                10.0.14.1
                                255.255.255.0
                                                 UGS
10.0.1.0
                10.0.14.1
                                255.255.255.0
                                                UGS
10.0.2.0
                10.0.14.1
                                255.255.255.0
                                                UGS
10.0.7.0
                10.0.16.2
                                255.255.255.0
10.0.8.0
                10.0.16.2
                                255.255.255.0
                                                 UGS
                                                                          4
10.0.10.0
                10.0.15.2
                                255.255.255.0
                                                UGS
                                                                          3
10.0.9.0
                                255.255.255.0
                10.0.15.2
                                                 UGS
10.0.6.0
                10.0.12.1
                                 255.255.255.0
                                                 UGS
10.0.5.0
                10.0.12.1
                                255.255.255.0
                                                 UGS
10.0.4.0
                10.0.12.1
                                255.255.255.0
                                                UGS
10.0.3.0
                10.0.12.1
                                255.255.255.0
                                                UGS
10.0.12.0
                0.0.0.0
                                 255.255.255.0
10.0.14.0
                0.0.0.0
                                255.255.255.0
                                                                          2
10.0.15.0
                0.0.0.0
                                255.255.255.0
10.0.16.0
                0.0.0.0
                                255.255.255.0
                                                                          4
```

```
Node: 16, Time: +10.0s, Local time: +10.0s, Ipv4ListRouting table
 Priority: 0 Protocol: ns3::Rip
Node: 16, Time: +10.0s, Local time: +10.0s, IPv4 RIP table
Destination
               Gateway
                               Genmask
                                               Flags Metric Ref
                                                                     Use Iface
10.0.3.0
                10.0.15.1
                                255.255.255.0
                                                UGS
10.0.4.0
                10.0.15.1
                                255.255.255.0
                                                UGS
10.0.5.0
                10.0.15.1
                                255.255.255.0
                                                UGS
                                                                         3
10.0.6.0
                10.0.15.1
                                255.255.255.0
                                                UGS
10.0.8.0
                10.0.15.1
                                255.255.255.0
                                                UGS
                                                UGS
10.0.7.0
                10.0.15.1
                                255.255.255.0
                                                                         3
10.0.2.0
                10.0.15.1
                                255.255.255.0
                                                UGS
                                                      4
                                                                         3
10.0.1.0
                10.0.15.1
                                255.255.255.0
                                                UGS
                10.0.15.1
                                255.255.255.0
                                                UGS
10.0.0.0
                                                                         3
10.0.11.0
                                255.255.255.0
                                                UGS
                10.0.15.1
                                                                         3
10.0.13.0
                10.0.15.1
                                255.255.255.0
                                                UGS
10.0.16.0
                10.0.15.1
                                255.255.255.0
                                                UGS
                                255.255.255.0
10.0.14.0
                10.0.15.1
                                                UGS
                                                                         3
10.0.12.0
                10.0.15.1
                                255.255.255.0
                                                UGS
                0.0.0.0
                                255.255.255.0
10.0.9.0
10.0.10.0
                0.0.0.0
                                255.255.255.0
10.0.15.0
                0.0.0.0
                                255.255.255.0
                                                U
                                                                         3
```

```
Node: 14, Time: +40.0s, Local time: +40.0s, Ipv4ListRouting table
 Priority: 0 Protocol: ns3::Rip
Node: 14, Time: +40.0s, Local time: +40.0s, IPv4 RIP table
Destination
               Gateway
                               Genmask
                                                Flags Metric Ref
                                                                    Use Iface
10.0.13.0
               10.0.14.1
                                255.255.255.0
                                                UGS
10.0.11.0
               10.0.14.1
                                255.255.255.0
                                                UGS
10.0.0.0
               10.0.14.1
                                255.255.255.0
                                                UGS
                                                                        2
10.0.1.0
               10.0.14.1
                                255.255.255.0
                                                UGS
10.0.2.0
               10.0.14.1
                                255.255.255.0
                                                UGS
10.0.7.0
               10.0.16.2
                                255.255.255.0
                                                UGS
                                                                        4
               10.0.16.2
                                255.255.255.0
                                               UGS
10.0.8.0
                                255.255.255.0
10.0.10.0
               10.0.15.2
                                                UGS
10.0.9.0
               10.0.15.2
                                255.255.255.0
                                                UGS
                                                                        3
10.0.6.0
               10.0.12.1
                                255.255.255.0
                                                UGS
10.0.5.0
               10.0.12.1
                                255.255.255.0
                                                UGS
10.0.4.0
               10.0.12.1
                                255.255.255.0
                                                UGS
               10.0.12.1
                                255.255.255.0
10.0.3.0
                                                UGS
10.0.12.0
               0.0.0.0
                                255.255.255.0
10.0.14.0
               0.0.0.0
                                255.255.255.0
                                                                        2
10.0.15.0
               0.0.0.0
                                255.255.255.0
10.0.16.0
                               255, 255, 255, 0
                                                                        4
               0.0.0.0
Node: 15, Time: +10.0s, Local time: +10.0s, Ipv4ListRouting table
 Priority: 0 Protocol: ns3::Rip
Node: 15, Time: +10.0s, Local time: +10.0s, IPv4 RIP table
Destination
                 Gateway
                                 Genmask
                                                 Flags Metric Ref
                                                                      Use Iface
                 10.0.16.1
                                 255.255.255.0
10.0.3.0
                                                 UGS
                                                                          4
                                 255.255.255.0
10.0.4.0
                 10.0.16.1
                                                 UGS
                                                                          4
10.0.5.0
                 10.0.16.1
                                 255.255.255.0
                                                 UGS
                                                        3
                                                                          4
10.0.6.0
                 10.0.16.1
                                 255.255.255.0
                                                 UGS
                                                                          4
10.0.9.0
                 10.0.16.1
                                 255.255.255.0
                                                  UGS
                                                                          4
10.0.10.0
                 10.0.16.1
                                 255.255.255.0
                                                  UGS
10.0.14.0
                 10.0.13.1
                                 255.255.255.0
                                                 UGS
                                                                          3
10.0.11.0
                 10.0.13.1
                                 255.255.255.0
                                                 UGS
10.0.0.0
                 10.0.13.1
                                 255.255.255.0
                                                 UGS
                                                                          3
10.0.1.0
                 10.0.13.1
                                 255.255.255.0
                                                 UGS
10.0.2.0
                 10.0.13.1
                                 255.255.255.0
                                                  UGS
                                 255.255.255.0
10.0.12.0
                 10.0.16.1
                                                  UGS
10.0.15.0
                 10.0.16.1
                                 255.255.255.0
                                                 UGS
10.0.7.0
                 0.0.0.0
                                 255.255.255.0
                                                                          1
                                 255.255.255.0
10.0.8.0
                 0.0.0.0
10.0.13.0
                 0.0.0.0
                                 255.255.255.0
                                                                          3
10.0.16.0
                 0.0.0.0
                                 255.255.255.0
Node: 13, Time: +40.0s, Local time: +40.0s, Ipv4ListRouting table
 Priority: 0 Protocol: ns3::Rip
Node: 13, Time: +40.0s, Local time: +40.0s, IPv4 RIP table
                Gateway
Destination
                                 Genmask
                                                   Flags Metric Ref
                                                                         Use Iface
                10.0.14.2
                                  255.255.255.0
10.0.3.0
                                                   UGS
10.0.4.0
                10.0.14.2
                                  255.255.255.0
                                                   LIGS
                                                                             3
10.0.5.0
                 10.0.14.2
                                  255.255.255.0
                                                   UGS
                                                                             3
```

255.255.255.0

255.255.255.0

255.255.255.0

255.255.255.0

255.255.255.0

255.255.255.0

255.255.255.0

255.255.255.0

255.255.255.0

255.255.255.0

255.255.255.0

255.255.255.0

255.255.255.0

255.255.255.0

UGS

UGS

UGS

UGS

LIGS

UGS

UGS

UGS

UGS

UGS

UGS

2

3

3

3

3

3

1

1

2

3

10.0.6.0

10.0.9.0

10.0.10.0

10.0.8.0

10.0.7.0

10.0.16.0

10.0.15.0

10.0.12.0

10.0.2.0

10.0.1.0

10.0.0.0

10.0.11.0

10.0.13.0

10.0.14.0

10.0.14.2

10.0.14.2

10.0.14.2

10.0.13.2

10.0.13.2

10.0.14.2

10.0.14.2

10.0.14.2

10.0.11.1

10.0.11.1

10.0.11.1

0.0.0.0

0.0.0.0

0.0.0.0

```
Node: 12, Time: +40.0s, Local time: +40.0s, IPv4 RIP table
Destination
               Gateway
                               Genmask
                                               Flags Metric Ref
                                                                    Use Iface
10.0.9.0
                10.0.12.2
                                255.255.255.0
                                                LIGS
10.0.10.0
                10.0.12.2
                                255.255.255.0
                                                UGS
10.0.8.0
               10.0.12.2
                                255.255.255.0
                                                UGS
10.0.7.0
               10.0.12.2
                                255.255.255.0
                                                UGS
                                                                        5
10.0.2.0
               10.0.12.2
                                255.255.255.0
                                                UGS
                                                      4
                                                                        5
10.0.1.0
               10.0.12.2
                                255.255.255.0
                                                UGS
                                                     4
                                                                        5
10.0.0.0
                10.0.12.2
                                255.255.255.0
                                                UGS
10.0.11.0
               10.0.12.2
                                255.255.255.0
                                                UGS
                                                UGS
10.0.13.0
               10.0.12.2
                                255.255.255.0
                                                                        5
10.0.16.0
               10.0.12.2
                                255.255.255.0
                                                UGS
                                                                        5
10.0.15.0
               10.0.12.2
                                255.255.255.0
                                                UGS
                                                                        5
10.0.14.0
                10.0.12.2
                                255.255.255.0
                                                UGS
                                255.255.255.0
10.0.3.0
               0.0.0.0
10.0.4.0
                                255.255.255.0
               0.0.0.0
                                                                        2
10.0.5.0
               0.0.0.0
                                255.255.255.0
                                                                        3
10.0.6.0
               0.0.0.0
                                255.255.255.0
                                                                        4
10.0.12.0
               0.0.0.0
                                255.255.255.0
                                                                        5
```

```
Node: 15, Time: +40.0s, Local time: +40.0s, Ipv4ListRouting table
Priority: 0 Protocol: ns3::Rip
Node: 15, Time: +40.0s, Local time: +40.0s, IPv4 RIP table
                Gateway
Destination
                                 Genmask
                                                 Flags Metric Ref
                                                                       Use Iface
10.0.3.0
                10.0.16.1
                                 255.255.255.0
                                                  UGS
                                                                          4
10.0.4.0
                10.0.16.1
                                 255.255.255.0
                                                  UGS
10.0.5.0
                10.0.16.1
                                 255.255.255.0
                                                  UGS
                                                  UGS 3
10.0.6.0
                10.0.16.1
                                 255.255.255.0
                                                 UGS 3
UGS 3
10.0.9.0
                10.0.16.1
                                 255.255.255.0
                                                                           4
10.0.10.0
                10.0.16.1
                                 255.255.255.0
                                                                           4
                                 255.255.255.0
                                                  LIGS
10.0.14.0
                10.0.13.1
                                                                           3
                                 255.255.255.0
10.0.11.0
                10.0.13.1
                                                  UGS
                                                                           3
10.0.0.0
                10.0.13.1
                                 255.255.255.0
                                                  UGS 3
                                                                           3
10.0.1.0
                10.0.13.1
                                 255.255.255.0
                                                  UGS
                10.0.13.1
                                 255.255.255.0
                                                  UGS
10.0.2.0
10.0.12.0
                10.0.16.1
                                 255.255.255.0
                                                  UGS
                                                                           4
10.0.15.0
                10.0.16.1
                                 255.255.255.0
                                                 UGS
10.0.7.0
                0.0.0.0
                                 255.255.255.0
10.0.8.0
                0.0.0.0
                                 255.255.255.0
                                                                           2
                                 255.255.255.0
10.0.13.0
                0.0.0.0
                                                                           3
10.0.16.0
                0.0.0.0
                                 255.255.255.0
                                                                           4
```

```
Node: 16, Time: +40.0s, Local time: +40.0s, Ipv4ListRouting table Priority: 0 Protocol: ns3::Rip
Node: 16, Time: +40.0s, Local time: +40.0s, IPv4 RIP table
                Gateway
Destination
                                Genmask
                                                  Flags Metric Ref
                                                                       Use Iface
                 10.0.15.1
                                  255.255.255.0
                                                  UGS 3
10.0.3.0
                                 255.255.255.0
10.0.4.0
                 10.0.15.1
                                                  UGS
                                                                            3
10.0.5.0
                 10.0.15.1
                                 255.255.255.0
                                                  UGS
                                                                            3
                 10.0.15.1
                                 255.255.255.0
                                                  UGS
10.0.6.0
                                                                            3
                                                  UGS
10.0.8.0
                 10.0.15.1
                                 255.255.255.0
                                                                            3
                                                  UGS
10.0.7.0
                 10.0.15.1
                                  255.255.255.0
                                                                            3
10.0.2.0
                 10.0.15.1
                                 255.255.255.0
                                                  UGS
10.0.1.0
                 10.0.15.1
                                 255.255.255.0
                                                  UGS
10.0.0.0
                 10.0.15.1
                                 255.255.255.0
                                                  UGS
                                                        4
10.0.11.0
                 10.0.15.1
                                 255.255.255.0
                                                  UGS
                                                                            3
                                 255.255.255.0
10.0.13.0
                 10.0.15.1
                                                  LIGS
                                                                            3
10.0.16.0
                 10.0.15.1
                                  255.255.255.0
                                                  UGS
                                  255.255.255.0
                                                  UGS
10.0.14.0
                 10.0.15.1
10.0.12.0
                 10.0.15.1
                                 255.255.255.0
                                                  UGS
10.0.9.0
                 0.0.0.0
                                 255.255.255.0
10.0.10.0
                 0.0.0.0
                                 255.255.255.0
10.0.15.0
                 0.0.0.0
                                 255, 255, 255, 0
```

```
Node: 16, Time: +80.0s, Local time: +80.0s, Ipv4ListRouting table
Priority: 0 Protocol: ns3::Rip
Node: 16, Time: +80.0s, Local time: +80.0s, IPv4 RIP table
Destination Gateway Genmask Flags Metri
                 Gateway
10.0.15.1
                                                    Flags Metric Ref
                                                                          Use Iface
10.0.3.0
                                   255.255.255.0
                                                    UGS
10.0.4.0
                 10.0.15.1
                                   255.255.255.0
                                                    UGS
10.0.5.0
                 10.0.15.1
                                   255.255.255.0
                                                    UGS
                                                                               3
                 10.0.15.1
                                   255.255.255.0
10.0.6.0
                                                    UGS
                                                    UGS
                                   255.255.255.0
10.0.8.0
                 10.0.15.1
10.0.7.0
                 10.0.15.1
                                   255.255.255.0
                                                    UGS
10.0.2.0
                 10.0.15.1
                                   255.255.255.0
                                                    UGS
10.0.1.0
                 10.0.15.1
                                   255.255.255.0
                                                    UGS
10.0.0.0
                 10.0.15.1
                                   255.255.255.0
                                                    UGS
10.0.11.0
                 10.0.15.1
                                   255.255.255.0
                                                    UGS
10.0.13.0
                 10.0.15.1
                                   255.255.255.0
                                                    UGS
10.0.16.0
                 10.0.15.1
                                   255.255.255.0
                                                    UGS
10.0.14.0
                 10.0.15.1
                                   255.255.255.0
                                                    UGS
                 10.0.15.1
                                   255.255.255.0
10.0.12.0
                                                    UGS
10.0.9.0
                 0.0.0.0
                                   255.255.255.0
10.0.10.0
                 0.0.0.0
                                   255.255.255.0
10.0.15.0
                 0.0.0.0
                                   255.255.255.0
```

Node: 15, Time:			Ipv4ListF	Routing	table		
	rotocol: ns3::						
Node: 15, Time:	+80.0s, Local	time: +80.0s,	IPv4 RIP	table			
Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
10.0.3.0	10.0.16.1	255.255.255.	0 UGS	3			4
10.0.4.0	10.0.16.1	255.255.255.	0 UGS	3			4
10.0.5.0	10.0.16.1	255.255.255.	0 UGS	3			4
10.0.6.0	10.0.16.1	255.255.255.	0 UGS	3			4
10.0.9.0	10.0.16.1	255.255.255.	0 UGS	3			4
10.0.10.0	10.0.16.1	255.255.255.	0 UGS	3			4
10.0.14.0	10.0.13.1	255.255.255.	0 UGS	2			3
10.0.11.0	10.0.13.1	255.255.255.	0 UGS	2			3
10.0.0.0	10.0.13.1	255.255.255.	0 UGS	3			3
10.0.1.0	10.0.13.1	255.255.255.	0 UGS	3			3
10.0.2.0	10.0.13.1	255.255.255.	0 UGS	3			3
10.0.12.0	10.0.16.1	255.255.255.	0 UGS	2			4
10.0.15.0	10.0.16.1	255.255.255.	0 UGS	2			4
10.0.7.0	0.0.0.0	255.255.255.	0 U	1			1
10.0.8.0	0.0.0.0	255.255.255.	0 U	1			2
10.0.13.0	0.0.0.0	255.255.255.	0 U	1			3
10.0.16.0	0.0.0.0	255.255.255.	0 U	1			4

				V 2000		
		time: +80.0s, Ipv	4ListRouting	table		
	<pre>0 Protocol: ns3::</pre>					
Node: 14, Ti	me: +80.0s, Local	time: +80.0s, IPv	4 RIP table			
Destination	Gateway	Genmask	Flags Metri	c Ref	Use	Iface
10.0.13.0	10.0.14.1	255.255.255.0	UGS 2			2
10.0.11.0	10.0.14.1	255.255.255.0	UGS 2			2
10.0.0.0	10.0.14.1	255.255.255.0	UGS 3			2
10.0.1.0	10.0.14.1	255.255.255.0	UGS 3			2
10.0.2.0	10.0.14.1	255.255.255.0	UGS 3			2
10.0.7.0	10.0.16.2	255.255.255.0	UGS 2			4
10.0.8.0	10.0.16.2	255.255.255.0	UGS 2			4
10.0.10.0	10.0.15.2	255.255.255.0	UGS 2			3
10.0.9.0	10.0.15.2	255.255.255.0	UGS 2			3
10.0.6.0	10.0.12.1	255.255.255.0	UGS 2			1
10.0.5.0	10.0.12.1	255.255.255.0	UGS 2			1
10.0.4.0	10.0.12.1	255.255.255.0	UGS 2			1
10.0.3.0	10.0.12.1	255.255.255.0	UGS 2			1
10.0.12.0	0.0.0.0	255.255.255.0	U 1			1
10.0.14.0	0.0.0.0	255.255.255.0	U 1			2
10.0.15.0	0.0.0.0	255.255.255.0	U 1			3
10.0.16.0	0.0.0.0	255.255.255.0	U 1			4

	+80.0s, Local t	ime: +80.0s, Ipv	ListRouting	table	
		.p :ime: +80.0s, IPv4	1 PTP table		
Destination	Gateway		Flags Metric	Ref Us	e Iface
10.0.3.0		255.255.255.0	UGS 3		
10.0.4.0		255.255.255.0	UGS 3		3
10.0.5.0		255.255.255.0	UGS 3		3
10.0.6.0		255.255.255.0	UGS 3		3
10.0.9.0	10.0.14.2	255.255.255.0	UGS 3		3
10.0.10.0	10.0.14.2	255.255.255.0	UGS 3		3
10.0.8.0	10.0.13.2	255.255.255.0	UGS 2		2
10.0.7.0	10.0.13.2	255.255.255.0	UGS 2		2
10.0.16.0	10.0.14.2	255.255.255.0	UGS 2		3
10.0.15.0	10.0.14.2	255.255.255.0	UGS 2		3
10.0.12.0	10.0.14.2	255.255.255.0	UGS 2		3
10.0.2.0	10.0.11.1	255.255.255.0	UGS 2		1
10.0.1.0	10.0.11.1	255.255.255.0	UGS 2		1
10.0.0.0	10.0.11.1	255.255.255.0	UGS 2		1
10.0.11.0	0.0.0.0	255.255.255.0	U 1		1
10.0.13.0	0.0.0.0	255.255.255.0	U 1		2
10.0.14.0	0.0.0.0	255.255.255.0	U 1		3

Node: 12, Time:			Ipv4L	istRouting	table		
	rotocol: ns3::F						
Node: 12, Time:	+80.0s, Local	time: +80.0s,	IPv4	RIP table			
Destination	Gateway	Genmask	F	lags Metri	c Ref	Use	Iface
10.0.9.0	10.0.12.2	255.255.255	.0 U	GS 3			5
10.0.10.0	10.0.12.2	255.255.255	.0 U	GS 3			5
10.0.8.0	10.0.12.2	255.255.255	.0 U	GS 3			5
10.0.7.0	10.0.12.2	255.255.255	.0 U	GS 3			5
10.0.2.0	10.0.12.2	255.255.255	.0 U	GS 4			5
10.0.1.0	10.0.12.2	255.255.255	.0 U	GS 4			5
10.0.0.0	10.0.12.2	255.255.255	.0 U	GS 4			5
10.0.11.0	10.0.12.2	255.255.255	.0 U	GS 3			5
10.0.13.0	10.0.12.2	255.255.255	.0 U	GS 3			5
10.0.16.0	10.0.12.2	255.255.255	.0 U	GS 2			5
10.0.15.0	10.0.12.2	255.255.255	.0 U	GS 2			5
10.0.14.0	10.0.12.2	255.255.255	.0 U	GS 2			5
10.0.3.0	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			2
10.0.5.0	0.0.0.0	255.255.255	.0 U	1			3
10.0.6.0	0.0.0.0	255.255.255	.0 U	1			4
10.0.12.0	0.0.0.0	255.255.255	.0 U	1			5

Node: 11, Time:	+80.0s, Local	time: +80.0s, Ip\	/4ListRout	ing table		
Priority: 0 Pr	rotocol: ns3::R	lip				
Node: 11, Time:	+80.0s, Local	time: +80.0s, IP	/4 RIP tab	le		
Destination	Gateway	Genmask	Flags Met	tric Ref	Use	Iface
10.0.10.0	10.0.11.2	255.255.255.0	UGS 4			4
10.0.9.0	10.0.11.2	255.255.255.0	UGS 4			4
10.0.6.0	10.0.11.2	255.255.255.0	UGS 4			4
10.0.5.0	10.0.11.2	255.255.255.0	UGS 4			4
10.0.4.0	10.0.11.2	255.255.255.0	UGS 4			4
10.0.3.0	10.0.11.2	255.255.255.0	UGS 4			4
10.0.14.0	10.0.11.2	255.255.255.0	UGS 2			4
10.0.13.0	10.0.11.2	255.255.255.0	UGS 2			4
10.0.12.0	10.0.11.2	255.255.255.0	UGS 3			4
10.0.15.0	10.0.11.2	255.255.255.0	UGS 3			4
10.0.16.0	10.0.11.2	255.255.255.0	UGS 3			4
10.0.7.0	10.0.11.2	255.255.255.0	UGS 3			4
10.0.8.0	10.0.11.2	255.255.255.0	UGS 3			4
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
10.0.11.0	0.0.0.0	255.255.255.0	U 1			4

Ans 3 ) Observation is that link is getting break because of which the is increasing and which leads to the change in the routes of the packets.

