THADOMAL SHAHANI TSEC ENGINEERING COLLEGE

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CN-ASSIGNMENT-05

Aim:-

Simulation of Network with specific routing protocols.

Lab Outcomes:-

LO 3: -To understand the network simulator environment and visualize a network topology and observe its performance.

LO 5: -To observe and study the traffic flow and the contents of protocol frames.

Theory:-

In computer networks, the two main important components are the source and destination. The information should be communicated from source to destination from time to time. The Communication between intermediate routers are specified using a routing protocol. There are many paths in which the data can be transferred. The process of selection of best path over other paths is known are routing; this can be done by software programmed devices known as protocols. Standard protocols help to find the best route to ensure good data transfer. The data packets that have to be sent will also be provided with some information to find the best routing protocol. The main purpose of routing protocols is to know about all the existing networking routes and make correct decisions.

Static Routing:-

Static routing can have a pre-defined and installed router with a single path given to the destination. This routing takes priority over routes chosen by dynamic routing protocols, and destination within routing tables is also forced. This is mainly suitable for medium to large-sized networks because the workload needed to run the network is large.

Dynamic Routing:-

Dynamic Routing or Adaptive Routing, as name suggests changes the routing table once any changes to network occurs or network topology changes.

Distance Vector Routing Protocol:-

Distance Vector Routing protocol is a 'dynamic routing' protocol. With this protocol, every router in the network creates a routing table which helps them in determining the shortest path through the network. All the routers in the network are aware of every other router in the network and they keep on updating their routing table periodically.

The term distance vector refers to the fact that the protocol manipulates vectors arrays of distances to other nodes in the network. The distance vector algorithm was the original ARPANET routing algorithm and was implemented more widely in local area networks with the Routing Information Protocol .

Link State Protocols:-

Link state protocols are also called shortest-path-first protocols. Link state routing protocols have a complete picture of the network topology. Hence they know more about the whole network than any distance vector protocol.

Code:-

```
set ns [new Simulator]

set nr [open chintan.tr w]

$ns trace-all $nr

set nf [open chintan.nam w]

$ns namtrace-all $nf

proc finish { } {

global ns nr nf

$ns flush-trace

close $nf

close $nr
```

```
exec nam chintan.nam &

exit 0

}

for { set i 0 } { $i < 6} { incr i 1 } {

set n($i) [$ns node]}

for {set i 0} {$i < 5} {incr i} {

$ns duplex-link $n($i) $n([expr $i+1]) 1Mb 10ms DropTail }

$ns duplex-link $n(0) $n(5) 1Mb 10ms DropTail

$ns duplex-link-op $n(0) $n(1) orient left

$ns duplex-link-op $n(1) $n(2) orient left-down

$ns duplex-link-op $n(2) $n(3) orient down

$ns duplex-link-op $n(3) $n(4) orient right

$ns duplex-link-op $n(4) $n(5) orient right-up

$ns duplex-link-op $n(5) $n(0) orient up

set udp0 [new Agent/UDP]

$ns attach-agent $n(0) $udp0

set cbr0 [new Application/Traffic/CBR]

$cbr0 set packetSize_ 500

$cbr0 set interval_ 0.005

$cbr0 attach-agent $udp0
```

```
set null0 [new Agent/Null]

$ns attach-agent $n(5) $null0

$ns connect $udp0 $null0

set udp1 [new Agent/UDP]

$ns attach-agent $n(1) $udp1

set cbr1 [new Application/Traffic/CBR]

$cbr1 set packetSize_ 500

$cbr1 set interval_ 0.05

$cbr1 attach-agent $udp1

set null0 [new Agent/Null]

$ns attach-agent $n(5) $null0

$ns connect $udp1 $null0

set tcp [new Agent/TCP]

$tcp set class_ 2

$ns attach-agent $n(3) $tcp

set sink [new Agent/TCPSink]

$ns attach-agent $n(4) $sink

$ns connect $tcp $sink

set ftp [new Application/FTP]

$ftp attach-agent $tcp
```

```
$ftp set type_ FTP

$ns rtproto DV

$ns rtmodel-at 10.0 down $n(3) $n(4)

$ns rtmodel-at 15.0 down $n(1) $n(2)

$ns rtmodel-at 30.0 up $n(4) $n(5)

$udp0 set fid_ 1

$udp1 set fid_ 2

$ns color 1 Red

$ns color 2 Yellow

$ns at 1.0 "$cbr0 start"

$ns at 2.0 "$cbr1 start"

$ns at 5.0 "$ftp start"

$ns at 20.0 "$ftp stop"

$ns at 45 "finish"

$ns run
```

Explanation:-

- for { set i 0 } { $i < 6} { incr i 1 } {set n($i) [$ns node]}

  This part of code will create nodes 6 nodes

- $ns duplex-link-op $n(0) $n(1) orient left

  This types of statement in code basically helps in orientaton of nodes as specified in the code.

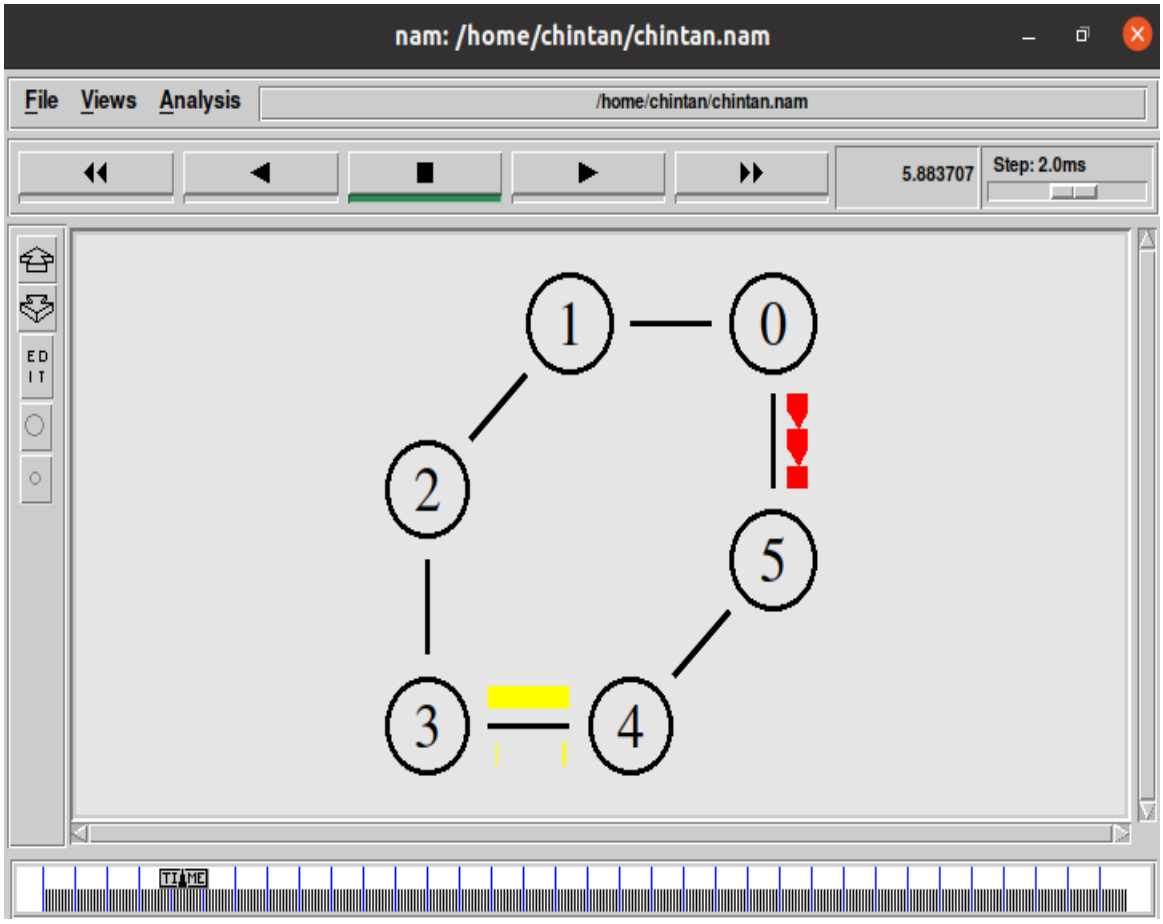
- $ns rtproto DV

  It uses Dynamic routing. rtproto is the instance procedure in the Simulator that specifies the unicast routing protocol to be used in the simulation.

- $ns rtmodel-at 10.0 down $n(3) $n(4)
  $ns rtmodel-at 15.0 down $n(1) $n(2)
  $ns rtmodel-at 30.0 up $n(4) $n(5)

  The command takes the time, operation, and node or link as arguments, and applies the operation to the node or link at the specified time. Here we can see n o/p that at time 10.0 -15.0 the link will be down and similarly at 4 and 5 node.

Output:-


nam: /home/chintan/chintan.nam
File
Views
Analysis
/home/chintan/chintan.nam
5.883707
Step: 2.0ms
ED IT
TIME
0
1
2
3
4
5

TR FILE:-

event	time	from node	to node	pkt type	pkt size	flags	fid	src addr	dst addr	seq num	pkt id
+	0.00017	0	1	rtProtoDV	6	-------	0	0.2	1.2	-1	0
-	0.00017	0	1	rtProtoDV	6	-------	0	0.2	1.2	-1	0
+	0.00017	0	5	rtProtoDV	6	-------	0	0.2	5.3	-1	1
-	0.00017	0	5	rtProtoDV	6	-------	0	0.2	5.3	-1	1
+	0.007102	2	1	rtProtoDV	6	-------	0	2.1	1.2	-1	2
-	0.007102	2	1	rtProtoDV	6	-------	0	2.1	1.2	-1	2
+	7.399248	3	4	tcp	1040	-------	2	3.0	4.0	302	2054
+	7.4	0	5	cbr	500	-------	1	0.0	5.0	1280	2055
-	7.4	0	5	cbr	500	-------	1	0.0	5.0	1280	2055
+	7.4	1	0	cbr	500	-------	2	1.0	5.1	108	2056
-	7.4	1	0	cbr	500	-------	2	1.0	5.1	108	2056
-	5.335	0	5	cbr	500	-------	1	0.0	5.0	867	1092
r	5.33584	4	3	ack	40	-------	2	4.0	3.0	34	1088
+	5.33584	3	4	tcp	1040	-------	2	3.0	4.0	54	1093
r	5.336	0	5	cbr	500	-------	1	0.0	5.0	864	1086
+	5.34	0	5	cbr	500	-------	1	0.0	5.0	868	1094
-	5.34	0	5	cbr	500	-------	1	0.0	5.0	868	1094
r	5.34	0	5	cbr	500	-------	1	0.0	5.0	865	1087
-	5.34048	3	4	tcp	1040	-------	2	3.0	4.0	38	1032
r	5.34216	3	4	tcp	1040	-------	2	3.0	4.0	36	1026
+	5.34216	4	3	ack	40	-------	2	4.0	3.0	36	1095
-	5.34216	4	3	ack	40	-------	2	4.0	3.0	36	1095

Conclusion:-

Thus, Simulation of network with specific routing protocols Distance vector and link state was studied and the code was executed and desired output was obtained.