THADOMAL SHAHANI TSEC ENGINEERING COLLEGE

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Lab Assignment No-05

Aim: Simulation of Routing Protocol (Distance Vector/Link State)

Lab Outcome Attained:

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:

ROUTING:

- A Router is a process of selecting path along which the data can be transferred from source to the destination. Routing is performed by a special device known as a router.
- A Router works at the network layer in the OSI model and internet layer in TCP/IP model
- A router is a networking device that forwards the packet based on the information available in the packet header and forwarding table.
- The routing algorithms are used for routing the packets. The routing algorithm is nothing but a software responsible for deciding the optimal path through which packet can be transmitted.
- The routing protocols use the metric to determine the best path for the packet delivery. The metric is the standard of measurement such as hop count, bandwidth, delay, current load on the path, etc. used by the routing algorithm to determine the optimal path to the destination.

Routing can be classified into three categories:

- Static Routing

- Default Routing
- Dynamic Routing

Static Routing

- Static Routing is also known as Nonadaptive Routing.
- It is a technique in which the administrator manually adds the routes in a routing table.
- A Router can send the packets for the destination along the route defined by the administrator.
- In this technique, routing decisions are not made based on the condition or topology of the networks

Default Routing

- Default Routing is a technique in which a router is configured to send all the packets to the same hop device, and it doesn't matter whether it belongs to a particular network or not. A Packet is transmitted to the device for which it is configured in default routing.
- Default Routing is used when networks deal with the single exit point.
- It is also useful when the bulk of transmission networks have to transmit the data to the same hp device.
- When a specific route is mentioned in the routing table, the router will choose the specific route rather than the default route. The default route is chosen only when a specific route is not mentioned in the routing table.

Dynamic Routing

- It is also known as Adaptive Routing.
- It is a technique in which a router adds a new route in the routing table for each packet in response to the changes in the condition or topology of the network.
- Dynamic protocols are used to discover the new routes to reach the destination.
- In Dynamic Routing, RIP and OSPF are the protocols used to discover the new routes.
- If any route goes down, then the automatic adjustment will be made to reach the destination.

Distance Vector Routing Algorithm

The Distance vector algorithm is iterative, asynchronous and distributed.

- **Distributed:** It is distributed in that each node receives information from one or more of its directly attached neighbors, performs calculation and then distributes the result back to its neighbors.
- **Iterative:** It is iterative in that its process continues until no more information is available to be exchanged between neighbors.
- **Asynchronous:** It does not require that all of its nodes operate in the lock step with each other.

- The Distance vector algorithm is a dynamic algorithm.
- It is mainly used in ARPANET, and RIP.
- Each router maintains a distance table known as **Vector**.

CODE:

```
set ns [new Simulator]

set nr [open 3.tr w]

$ns trace-all $nr

set nf [open 3.nam w]


$ns namtrace-all $nf

    proc finish { } {

    global ns nr nf

    $ns flush-trace

    close $nf
```

```
close $nr

exec nam 3.nam &

    exit 0

}


for { set i 0 } { $i < 12} { incr i 1 } {

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

we connect eight nodes using for loop

```
for {set i 0} {$i < 8} {incr i} {

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

$ns duplex-link $n(0) $n(8) 1Mb 10ms DropTail

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

$ns duplex-link $n(0) $n(9) 1Mb 10ms DropTail

$ns duplex-link $n(9) $n(11) 1Mb 10ms DropTail

$ns duplex-link $n(10) $n(11) 1Mb 10ms DropTail

$ns duplex-link $n(11) $n(5) 1Mb 10ms DropTail


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_ 0.005

$cbr1 attach-agent $udp1

set null0 [new Agent/Null]

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

$ns connect $udp1 $null0
```

We set a routing protocol

```
$ns rtproto DV
```

Here we stimulate node failure/restoration

```
$ns rtmodel-at 10.0 down $n(11) $n(5)

$ns rtmodel-at 15.0 down $n(7) $n(6)

$ns rtmodel-at 30.0 up $n(11) $n(5)

$ns rtmodel-at 20.0 up $n(7) $n(6)


$udp0 set fid_ 1

$udp1 set fid_ 2

$ns color 1 Red

$ns color 2 Green
```

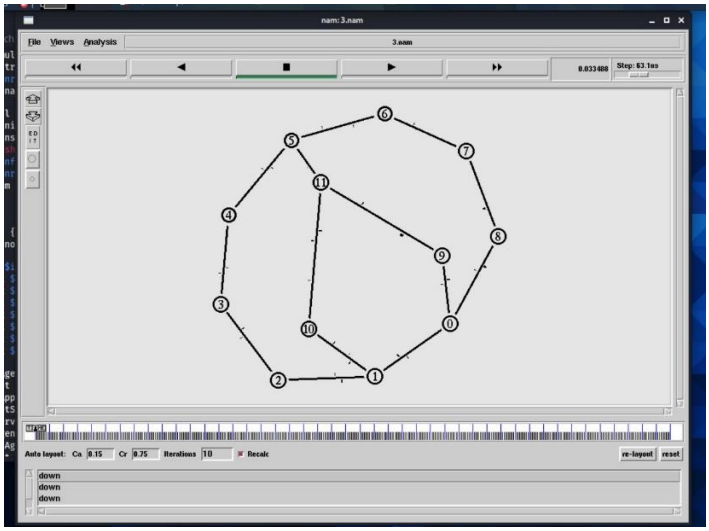
$ns at 1.0 "$cbr0 start"

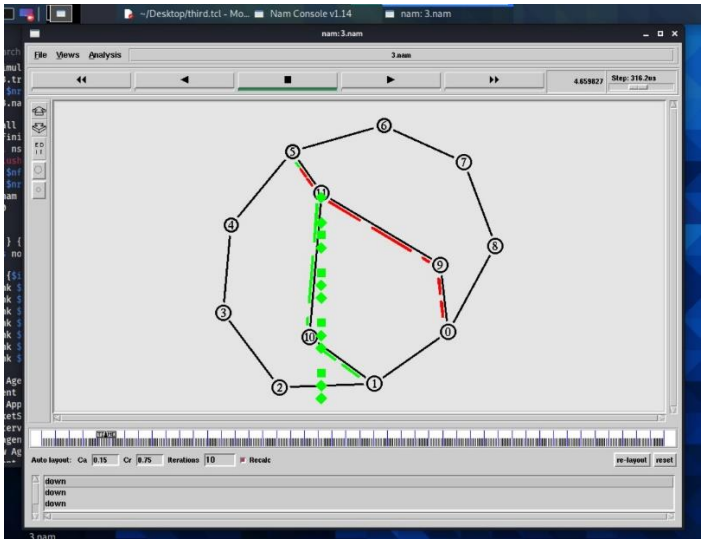
$ns at 2.0 "$cbr1 start"

$ns at 45 "finish"

$ns run

OUTPUT:





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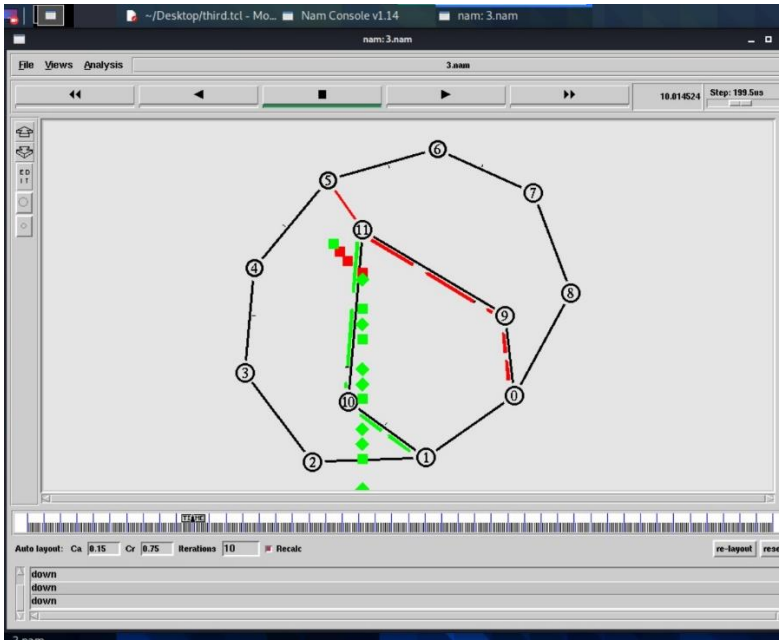

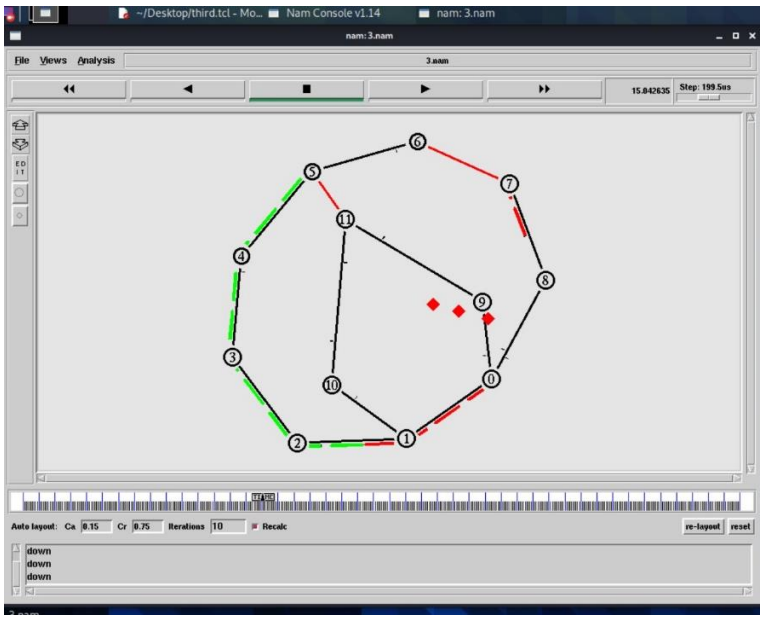

Out.tr file

+	0.00017	0	1	rtProtoDV	12	------	0	0.2	1.2	-1	0
-	0.00017	0	1	rtProtoDV	12	------	0	0.2	1.2	-1	0
+	0.00017	0	8	rtProtoDV	12	------	0	0.2	8.1	-1	1
-	0.00017	0	8	rtProtoDV	12	------	0	0.2	8.1	-1	1
-	1	0	9	cbr	500	-----	1	0.0	5.0	0	199

-	1	0	9	cbr	500	------	1	0.0	5.0	0	199
+	1.005	0	9	cbr	500	------	1	0.0	5.0	1	200
-	1.005	0	9	cbr	500	------	1	0.0	5.0	1	200
+	1.01	0	9	cbr	500	------	1	0.0	5.0	2	201
-	1.01	0	9	cbr	500	------	1	0.0	5.0	2	201
r	1.014	0	9	cbr	500	------	1	0.0	5.0	0	199

+ = enqueued , - =dequeued , r = received

Conclusion:

Hence, simulation of Routing Protocol (Distance Vector/Link State) is implemented.