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**Experiment No 13**

**Title :**

Simulate the transmission of ping messages over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.

**Theory :**

Ping is a basic Internet program that allows a user to verify that a particular IP address exists and can accept requests. Ping is used diagnostically to ensure that a host computer the user is trying to reach is actually operating. Ping works by sending an Internet Control Message Protocol (ICMP) Echo Request to a specified interface on the network and waiting for a reply. Ping can be used for troubleshooting to test connectivity and determine response time.

**Explanation:**

The following script can be run on linux terminal using the command ns ping.tcl(if the tcl script is saved as ping.tcl). It opens up a NAM(Network Animator).NAM is a **Tcl/Tk based animation tool** for viewing network simulation traces and real world packet traces. It supports topology layout, packet level animation, and various data inspection tools.It has a graphical interface, which can provide information such as number of packets drops at each link. It also creates a trace file.

The trace file contains the following detail:-

```
<Event> <time> <from> <to> <pkt> <size> -- <fid> <src> <dst> <seq> <attr>
+ 1 0 2 cbr 210 ----- 0 0.0 3.1 0 0
- 1 0 2 cbr 210 ----- 0 0.0 3.1 0 0
r 1.00234 0 2 cbr 210 ----- 0 0.0 3.1 0 0
```

Event “+”: enqueue, “-”: dequeue; “r”: received.

It also has an AWK file which is an interpreted programming language designed for text processing and typically used as a data extraction and reporting tool.

**Output:**

node 1 received ping answer from 4 with round-trip-time 162.0 ms.  
node 2 received ping answer from 5 with round-trip-time 222.0 ms.  
node 3 received ping answer from 6 with round-trip-time 201.0 ms.  
node 4 received ping answer from 1 with round-trip-time 162.0 ms.  
node 5 received ping answer from 2 with round-trip-time 222.0 ms.  
node 6 received ping answer from 3 with round-trip-time 201.0 ms.

No of packets dropped : 0

Here there are no packets dropped since there is a direct connection between all the pair of nodes via node 0.

node 2 received ping answer from 5 with round-trip-time 222.0 ms.

node 3 received ping answer from 6 with round-trip-time 201.0 ms.

node 5 received ping answer from 2 with round-trip-time 222.0 ms.

node 6 received ping answer from 3 with round-trip-time 201.0 ms.

No of packets dropped : 2

Here there is a drop between node 1 and node 4 since there queue-limit was set to 0 and hence we can see a black square drop from node 0.

**Configuration:**

\$netSimInstance connect \$pingAgent1 \$pingAgent4

\$netSimInstance connect \$pingAgent2 \$pingAgent5

\$netSimInstance connect \$pingAgent3 \$pingAgent6

Here Agent1 is connected to Agent4, Agent2 with Agent5, Agent3 with Agent6.

\$netSimInstance at 0.1 "\$pingAgent1 send"

\$netSimInstance at 0.3 "\$pingAgent2 send"

\$netSimInstance at 0.5 "\$pingAgent3 send"

\$netSimInstance at 1.0 "\$pingAgent4 send"

\$netSimInstance at 1.2 "\$pingAgent5 send"

\$netSimInstance at 1.5 "\$pingAgent6 send"

\$netSimInstance at 2.0 "finish"

This shows the time at which each agent/node sends the packets. The simulation finishes at 2.0 seconds.

