ASSIGNMENT – IV DATED 20-Oct-17

POINTS TO NOTE:
a) Submit the workings of all the programs given here.
b) More weightage will be given for submitting the Premium questions section of the assignment.
c) Code should not be lifted out of internet and submitted and neither should it be copied between friends. Explanations on the implementation will be sought before awarding the credits for the assignment.
d) The assignment should be submitted to the email id iiitdmcn@gmail.com FROM your IIITDM account ON OR BEFORE 02-Nov-17

PROGRAMS:

1. We have learnt in TCP class that the retransmission timout interval is not calculated with the ACKs for retransmission messages. However in a lossy network, if most of the packets had to be retransmitted, this would prevent the frequent recalculations of the timeout interval which would be reflecting the actual network state. Using the NS simulation, implement the enhancement in logic for this rule and justify your implementation.

2. Implement a script that is capable of generating a typical characteristic traffic both on an incoming and outgoing link. The NS script can make use of an existing library for the same in which the traffic could be "originally learnt". The traffic simulated should pertain to a MSS size of 1200 bytes and also disabling Nagle's algorithm.

3. A topology is supposed to extrapolate the following parameters:

- Ø Access-link bandwidths – 1000 Mbps
- Ø Access-link delays –[10ms,100ms] ,40ms spacing
- Ø Flow-level load: 0.8
- Ø Bottleneck-link bandwidth – 20 Mbps
- Ø Bottleneck-link delay – 5 ms
- Ø Queue limits:
  Bottleneck queue:1500 packets
  Access queue:1500 packets
- Ø Packet loss in the loss module, p: [0.1, 5] %

In the above scenario, simulated transfer time and analytical flow transfer time are to be compared.(Use NS2).

Equal loss rates for different RTT classes are extracted by introducing separate loss module in the bottleneck link.

The artificial loss module in NS-2 generates losses randomly in the bottleneck link queue.The packets in the queue are dropped with equal probability,p.

Compare the simulated and theoretical model.

Hint:

Inter-arrival time:0.8

Introduce for RTT classes

The topology followed is an isomorphic class of trees with 6 nodes,out of which 4 are leaves.

PREMIUM QUESTIONS:

1. Using Quagga router software, make changes to BGP as follows, and integrate this into MININET so that you can do the testing:
Each AS is assigned a value by the administrator called PWR. Instead of finding AS- Shortest Path based on AS-PATH-INFO attribute of BGP you need to find the shortest SUM OF PWR path. (using Dijkstra's shortest path algorithm). You need to assign PWR as the weight to each AS and then apply Dijkstra's shortest path algorithm so that BGP installs this path in the routing table of Linux instead of the shortest AS path.

2. **Source based routing scheme.**
In this method, the source and the neighbours exchange their neighbour information and based on this the source tells its neighbours the path the use. The neighbours will modify their routing tables according to the path mentioned by the source. Demonstrate this in Mininet. The source should be able to choose multiple paths if any path is not available. The intermediate routers can tell the source that a path may not be available.

3. Probabilistic routing

In this project you will develop a protocol where it does not use a routing table. Each packet will be routed to an interface based on probability (1/N) where N is the number of interface. For example if there is only one interface all packets will be routed in that interface except those that are destined for that host. Determine the relationship between max hop limit and the size of the network, using this protocol. You could implement this protocol in mininet so that large networks can be simulated.