



## NetSim Version 8 – List of Lab experiments for Simulation and Programming

### Part A: Simulation Experiments

#### Internetworks

1. To understand IP forwarding within a LAN and across a router  
**Note:** NetSim Standard Version is required to run this experiment
2. Study the working of the spanning tree algorithm by varying the priority among the switches.
3. To understand the working of “Connection Establishment “in TCP using NetSim.  
**Note:** NetSim Standard Version is required to run this Experiment.
4. During client-server TCP downloads study the throughputs of Slow start + Congestion avoidance (also known as Old Tahoe) and Fast Retransmit (also known as Tahoe), Congestion Control Algorithms.
5. To study how the Bit Error Rate (loss) and data of a Wireless LAN (IEEE 802.11b) network varies as the distance between the Access Point and the wireless nodes is varied.
6. Analysis for capacity evaluation of an infrastructure IEEE 802.11 based network carrying a full-duplex packet telephone calls. (Ref: IEEE paper “Analytical Models for Capacity Estimation of IEEE 802.11 WLANs using DCF for Internet Applications” by George Kuriakose, Sri Harsha, Anurag Kumar and Vinod Sharma)
7. Capacity evaluation of an infrastructure IEEE 802.11 based network carrying TCP controlled file downloads.(Ref: IEEE paper “Analytical Models for Capacity Estimation of IEEE 802.11 WLANs using DCF for Internet Applications” by George Kuriakose, Sri Harsha, Anurag Kumar and Vinod Sharma)
8. Study the working and routing table formation of Interior Routing Protocol i.e. Routing Information Protocol (RIP) and Open Shortest Path First (OSPF)

### Legacy Networks

9. Study the throughput characteristics of a slotted aloha network
10. Understand the impact of bit error rate on packet error rate and investigate the impact of error of a simple hub based CSMA / CD network
11. To determine the optimum persistence of a p-persistent CSMA / CD network for a heavily loaded bus capacity.
12. Study the effect of Peak Cell Rate (per Sec) and Cell Delay Variation Tolerance on the performance of an ATM Networks
13. Study the performance of FIFO, round Robin and Priority queuing techniques in an ATM network

### Advanced Wireless Networks

14. To create scenario and study the performance of MANET mobility model using NetSim simulation.
15. To study the Call Blocking probability of a Wi-MAX (IEEE 802.16 – 2004) network varies for UGS (Unsolicited Grant Service) QoS Class as the number of transmitting SSS increase beyond the bandwidth limit.

### Advanced Routing

16. Study the working of BGP and formation of BGP Routing table
17. Study how the LSP varies for different traffic in MPLS -TE (Traffic Engineering)

### Cellular Networks

18. Study how call blocking probability varies as the load on a GSM network is continuously increased
19. Study how the number of channels increases and the Call blocking probability decreases as the Voice activity factor of a CDMA network is decreased

### Wireless Sensor Networks (WSN)

20. Study the Super Frame Structure and analyze the effect of SuperFrame order on throughput

### Personal Area Networks (PAN)

21. Analyze the scenario shown, where Node 1 transmits data to Node 2, with no path loss and obtain the theoretical throughput based on IEEE 802.15.4 standard. Compare this with the simulation result.

## **Part B: List of C / C++ Programming Lab Exercises**

### **(Source code is provided along with)**

1. Address Resolution Protocol
2. Assignments of Sites to Concentrators
3. Cryptography
  - Substitution
  - Transposition
  - XOR
  - Advanced
    - a) Data Encryption Standard
    - b) Rivest Shamir Adleman (RSA)
    - c) Wired Equivalent Privacy (WEP)
4. Distance Vector Routing
5. Error Correcting Code
  - Hamming Code
6. Error Detection Code
  - Cyclic Redundancy Check (CRC)
  - Longitudinal Redundancy Check (LRC)
7. Framing Sequence
  - Bit Stuffing
  - Character Stuffing
8. Generic Cell Rate Algorithm
  - Virtual Scheduling Algorithm
9. IPV4 Addressing
  - Address Mask
  - Binary Conversion
  - Classless Inter Domain Routing
  - Network Address
  - Special Addresses
  - Sub-netting

10. Leaky Bucket Algorithm

11. Multi Level Multi Access

12. PC to PC Communication

- Socket Programming
- Chat Application

13. Scheduling

- First In First Out (FIFO)
- Max - Min Fair (MMF)

14. Shortest Path

- Floyd's
- Link State

15. Sorting Technique

- Bubble Sort
- Insertion Sort
- Quick Sort
- Selection Sort

16. Spanning Tree

- Borovska
- Kruskal
- Prims

17. Transmission Flow Control

- Go Back N
- Selective Repeat
- Stop and Wait