Planning Document

Course: Operating Systems   **Course Faculty: Dr Suresh Kumar K**

Activity: Virtual Lab: Simulation of Mobile Ad-hoc Networks
Class – IV Year VII Sem IT

Teaching Unit/Point: Unit 3 – Broad Topic – Ad-hoc Networks
                               Sub. Topic – Mobile Ad-hoc Networks

Learning Outcomes:

After completing this experiment, the students will be able to:

  ☐ Describe the basics of Mobile Ad-hoc Networks (MANETs)

1. Network simulator.

Network simulator2 (NS2) was designed to simulate and design mobile ad hoc networks that view graphically. It visually shows the network traffic (packet movement) and how the packets are transferred from the source node to the destination node. Students can visualize the mobility of the nodes for MANET simulation. We can design both wired and wireless networks with various network protocols such as DSR, AODV, DSDV etc. Also, we perform analytical studies using network performance metrics such as packet delivery ratio, end-to-end delay and throughput. This gives research insights and motivation to research this domain. We can install the NS2 Linux environment.

The following link is used to access the virtual lab.

http://vlab.co.in/   // URL for Virtual lab

http://vlabs.iitkgp.ernet.in/ant/   // URL for MANET simulation

This virtual lab is designed and implemented by IIT Kharagpur, India. This simulation supports various computer networks such as Local Area Network, Satellite Network, Wi-Fi Network, WiMAX Network, Mobile Ad-hoc Network, Wireless Sensor Network, Bluetooth Network and ZigBee Network.

3. Manual

Introduction.

 The prime goal of this simulation is to set up MANET with various routing protocols like AODV, DSR, and DSDV. The simulation is written by TCL script [2]. The network performance is analyzed by trace file. The trace file is generated automatically after the simulation is completed. The trace file contains all activities that happened during the simulation, and it recorded all the data based on the event. This simulation shows the MANET setup, how a packet is transferred from source to destination, what happens if the network gets disrupted, and how a new routing path is constructed after disruption or topology changes or node dead. This simulation has four mobile nodes and performs the packet transfer and acknowledgement, route disruption and new route formation. This simulation contains an introduction, theory, simulation, self-evaluation, procedure, exercises and references section to get the insight of routing in MANET.

Instructions to perform a simulation experiment.

- **Visit the following URL to perform a simulation for Routing in MANET.** http://vlabs.iitkgp.ernet.in/ant/7/
- This page contains five tabs: Introduction, theory, Simulation, Self-evaluation, procedure, exercise, and references to perform the MANET simulation.
- Select the simulation tab.

- Click button 1 to set up a MANET with four nodes. It shows how nodes form a network automatically and performs packet transformation from node1 to node 4 with acknowledgement. Figure 1 shows the simulation view.
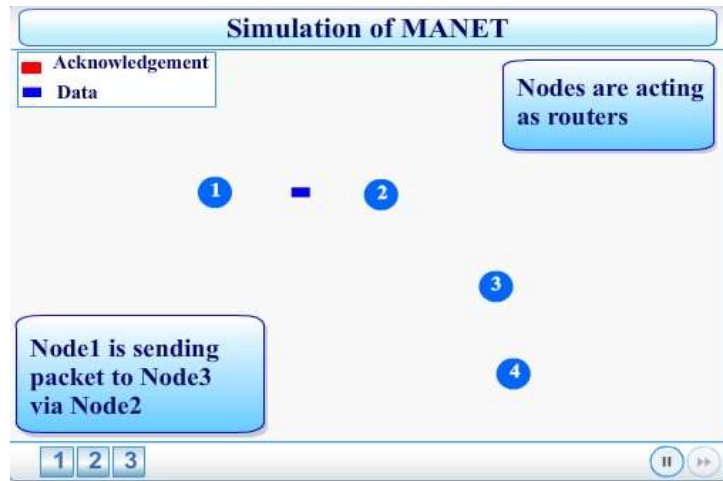

Figure1: Simulation view of four nodes

- Then, click button 2. It describes and shows a packet transformation when disruption of routing path between node 1 to node2. Here, when node2 moves out of the coverage, a new routing path will be constructed between node one and node two without node2. Figure 2 shows the route disruption scenario.
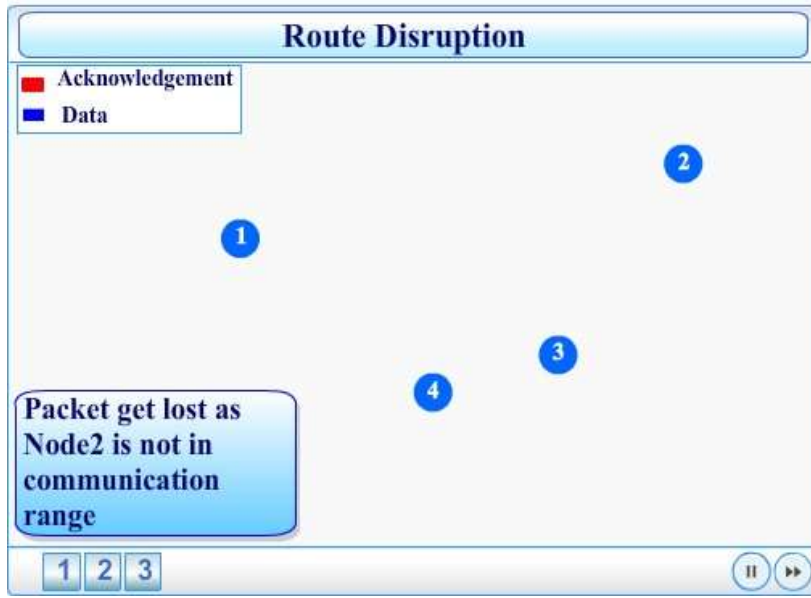
Figure 2: Node mobility.

A new routing path (path: Node1 – node 4 – node 3) will be constructed automatically when node2 move out of the transmission range. Figure 3 shows the packet transformation through the new routing path, and figure 4 shows the how acknowledgement packet transfers from the destination node(node3) to the source node (node1).
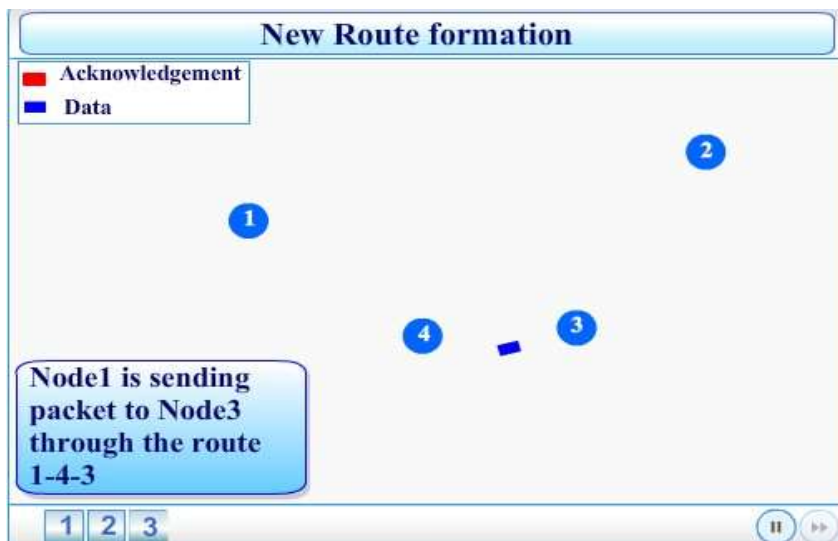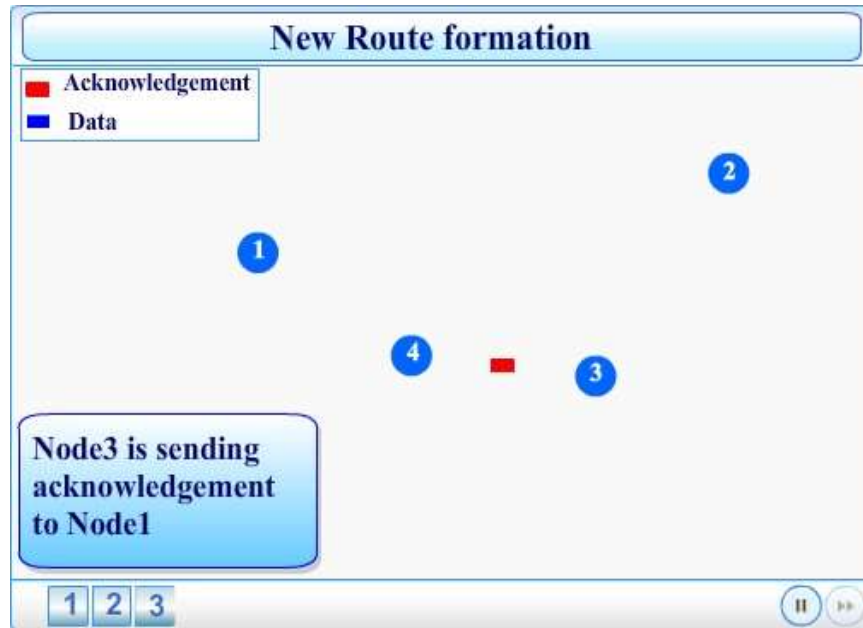

Figure 3: Packet transformation through the new route.

Figure 4: Acknowledgement packet transformation