Assignment No: C5

Problem Definition

Simulate the performance of DSDV,AODV and DSR routing protocols over the DWSN.Inastallation and configuration of WSN using Zigbee protocol.

Prerequisites

- Introduction to wireless sensor networks
- Knowledge about various software tools like NetAnim,NS,etc to simulate the wireless sensor network

Learning Objectives

- To understand the basics of wireless sensor networks
- Ability to use network simulator to simulate wireless networks
- Understand the working of wireless sensor networks

Mathematical Model

Let S be the system set of solution for the given problem statement such that
S={s, e , X, Y, f_{me}, DD, NDD ,f_s, shared_mem | ϕ }
where;
s=start state

i.e. setting up wireless network and establishing connection

e=end state

i.e. closing the connection

The setting up of the network can be described by a graph where,
$G = (V, E)$
V = vertices
$=\{n_1, n_2...n_n | n \epsilon I^+\}$
n_i represents the sensor node in network
E = connection link
$=\{e_{11}, e_{12}, ...e_{ij} | i, j \epsilon I^+\}$
where e_{ij} represents the connection between n_i and n_j nodes

X is the input set
X = $\{src, dest, packet\}$
where,
src is the source node i.e. src ϵV
dest is the destination node i.e dest ϵ V and src is not equal to dest

Y is the output set
Y = $\{analysis\}$
analysis includes packets received by destination and the time taken
efficiency = $\frac{packetsreceived}{packetssent}$ X 100

f_s = set of all functions

$f_s = \{f_r, f_{send}, f_{display}\}$

f_r : routing protocol function

f_{send} : function which sends the packets

$f_{display}$: function which displays the output

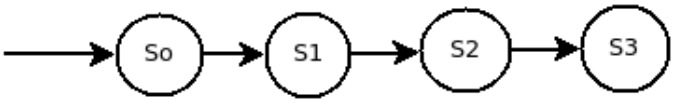
DD=Deterministic Data
Number of nodes in network,packets sent

NDD=Non Deterministic Data
Number of packets received at destination, efficiency

Success Case :
Successful communication between nodes

Failure Case :
Power failure,system crash

State Diagram



s0 : start state
s1 : sent the packets/communication
s2 : receive the packets/data
s3 : display information and exit

Theory

Wireless Sensor Networks :

A wireless sensor network (WSN) of spatially distributed autonomous sensors to monitor physical or environmental conditions, such as temperature, sound, pressure, etc. and to cooperatively pass their data

through the network to a main location.

The more modern networks are bi-directional, also enabling control of sensor activity. The development of wireless sensor networks was motivated by military applications such as battlefield surveillance; today such networks are used in many industrial and consumer applications, such as industrial process monitoring and control, machine health monitoring, and so on.

The WSN is built of "nodes" from a few to several hundreds or even thousands, where each node is connected to one (or sometimes several) sensors. Each such sensor network node has typically several parts: a radio transceiver with an internal antenna or connection to an external antenna, a microcontroller, an electronic circuit for interfacing with the sensors and an energy source, usually a battery or an embedded form of energy harvesting.

A sensor node might vary in size from that of a shoebox down to the size of a grain of dust, although functioning "motes" of genuine microscopic dimensions have yet to be created. The cost of sensor nodes is similarly variable, ranging from a few to hundreds of dollars, depending on the complexity of the individual sensor nodes.

Network simulator NS3 :
ns-3 is a discrete-event network simulator for Internet systems, targeted primarily for research and educational use. ns-3 is free software, licensed under the GNU GPLv2 license, and is publicly available for research, development, and use.

Steps to install NS3 on Fedora :

- Download ns-alliance-3.17.tar.gz
- Keep in root/home
- Execute ns-install.sh script
- Go to home/ns.alliance.3.17#./build.py
- NS installed
- Keep the program in ns-3.17/scratch

Steps to install NetAnimator :

- yum.install mercurial
- yum install qt4
- yum install qt4-devel
- Download NetAnim-3.10.3.tar.gz
- qmake
- make

Conclusion

We have successfully simulated a wireless sensor network and documented communication between two nodes using network simulator.