Sensor Network 802.15.4 AODV Simulation

The reason to write this topic is many people asked me how to simulate sensor networks. Obviously, authors of 802.15.4/Zigbee protocol developers on NS2 have given a sample examples. But, these examples do not run correctly, and give some kind of unknown error (at least I don't know what errors mean). Therefore, I have decided to test AODV using 802.15.4 MAC/PHY. Thus, if my tests work, I hope you can test your own routing protocols using this source code.

Alright, the TCL file is fairly simple. I briefly explain what means what. We first set simulation environment. We are going to deploy 500 nodes, in 1000x500 sqm area, simulation time is 500 seconds. And we are using 802.15.4 MAC/PHY and interface queue is 100. We also set simulator and files to trace the simulation.

```
# Generated by Topology Generator for Network Simulator (c) Elmurod Talipov
set val(chan)           Channel/WirelessChannel      ;# channel type
set val(prop)           Propagation/TwoRayGround     ;# radio-propagation model
set val(netif)          Phy/WirelessPhy/802_15_4     ;# network interface type
set val(mac)            Mac/802_15_4                 ;# MAC type
set val(ifq)            Queue/DropTail/PriQueue      ;# interface queue type
set val(ll)             LL                           ;# link layer type
set val(ant)            Antenna/OmniAntenna          ;# antenna model
set val(ifqlen)         100                          ;# max packet in ifq
set val(nn)             500                          ;# number of mobilenodes
set val(rp)             AODV                         ;# protocol tye
set val(x)              1000                         ;# X dimension of topography
set val(y)              500                          ;# Y dimension of topography
set val(stop)           500                          ;# simulation period
set val(energymodel)    EnergyModel                  ;# Energy Model
set val(initialenergy) 100                           ;# value

set ns                   [new Simulator]
set tracefd              [open trace-aodv-802-15-4.tr w]
set namtrace             [open nam-aodv-802-15-4.nam w]

$ns trace-all $tracefd
$ns namtrace-all-wireless $namtrace $val(x) $val(y)
```

Let's set radio transmission range to 40 meters, but this does not mean exactly 40 meters. The code below filters packet with receiving signal strength above "40 meters".

```
set dist(5m)  7.69113e-06
set dist(9m)  2.37381e-06
set dist(10m) 1.92278e-06
set dist(11m) 1.58908e-06
set dist(12m) 1.33527e-06
set dist(13m) 1.13774e-06
set dist(14m) 9.81011e-07
set dist(15m) 8.54570e-07
set dist(16m) 7.51087e-07
set dist(20m) 4.80696e-07
set dist(25m) 3.07645e-07
set dist(30m) 2.13643e-07
set dist(35m) 1.56962e-07
set dist(40m) 1.20174e-07
Phy/WirelessPhy set CSThresh_ $dist(40m)
Phy/WirelessPhy set RXThresh_ $dist(40m)
```

And lets set topography as flat, deploy nodes randomly in an area of 1000 x 500 sqm.

```
# set up topography object
set topo       [new Topography]
$topo load_flatgrid $val(x) $val(y)

create-god $val(nn)

# configure the nodes
$ns node-config -adhocRouting $val(rp) \
            -llType $val(ll) \
             -macType $val(mac) \
             -ifqType $val(ifq) \
             -ifqLen $val(ifqlen) \
             -antType $val(ant) \
             -propType $val(prop) \
             -phyType $val(netif) \
             -channel [new $val(chan)] \
             -topoInstance $topo \
             -agentTrace ON \
             -routerTrace ON \
             -macTrace  OFF \
             -movementTrace OFF \
             -energyModel $val(energymodel) \
             -initialEnergy $val(initialenergy) \
             -rxPower 35.28e-3 \
             -txPower 31.32e-3 \
             -idlePower 712e-6 \
             -sleepPower 144e-9

             #-IncomingErrProc MultistateErrorProc \
             #-OutgoingErrProc MultistateErrorProc
```