

Wireless Sensor Network simulation using *WSNet/Worldsense* simulator

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WSNet is an event-driven simulator for large scale wireless sensor networks. Its main features are:

- Node simulation
- Environment simulation
- Radio medium simulation
- Extensibility

For further details visit <http://wsnet.gforge.inria.fr/index.html>

It provides different models/API than can be used to run simulation.

Welcome Overview People License Download Installation / Usage Tools / Utilities	<h2>Models / API</h2> <p>The models included in the WSNet distribution are the following:</p> <table><tr><th>Models</th><th>Included in WSNet distribution</th></tr><tr><td>Radio propagation</td><td>file static, disk model (range), free space, tworay ground, lognormal shadowing, rayleigh fading, ITU indoor model, nakagami fading</td></tr><tr><td>Interferences</td><td>none, orthogonal, factor</td></tr><tr><td>Modulation</td><td>none, step, bpsk, oqpsk, mqam</td></tr><tr><td>Antenna</td><td>omnidirectional</td></tr><tr><td>Mobility</td><td>static, file static, billiard, torus central, torus plane, teleport</td></tr><tr><td>Battery/energy</td><td>linear</td></tr><tr><td>Environment</td><td>fire</td></tr><tr><td>Monitor</td><td>nodes, nrj</td></tr><tr><td>Radio</td><td>half1d, 802.15.4 868MHz bpsk, 802.15.4 902MHz bpsk, 802.15.4 2400MHz oqpsk</td></tr><tr><td>MAC</td><td>802.11 DCF, 802.15.4 868MHz bpsk, 802.15.4 902MHz bpsk, 802.15.4 2400MHz oqpsk, B-MAC, Ideal MAC</td></tr><tr><td>Routing</td><td>greedy geographic, file static</td></tr><tr><td>Application</td><td>CBR, CBR v2, Hello protocol, GHT, LBDD, XY, Data Sink, Data Source, GOSSIP, B-MAC application sample</td></tr></table>	Models	Included in WSNet distribution	Radio propagation	file static , disk model (range), free space , tworay ground , lognormal shadowing , rayleigh fading , ITU indoor model , nakagami fading	Interferences	none , orthogonal , factor	Modulation	none , step , bpsk , oqpsk , mqam	Antenna	omnidirectional	Mobility	static , file static , billiard , torus central , torus plane , teleport	Battery/energy	linear	Environment	fire	Monitor	nodes , nrj	Radio	half1d , 802.15.4 868MHz bpsk , 802.15.4 902MHz bpsk , 802.15.4 2400MHz oqpsk	MAC	802.11 DCF , 802.15.4 868MHz bpsk , 802.15.4 902MHz bpsk , 802.15.4 2400MHz oqpsk , B-MAC , Ideal MAC	Routing	greedy geographic , file static	Application	CBR , CBR v2 , Hello protocol , GHT , LBDD , XY , Data Sink , Data Source , GOSSIP , B-MAC application sample
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Documentation: FAQ Models/API Tutorials Publications																											
Developpers: Project website Mailing lists																											
Contact: Contact Related																											

Installation:

Details can be found at <http://wsnet.gforge.inria.fr/installation.html>

Usage:

Once WSNet is properly compiled and installed you can run a simulation by executing the **wsnet** binary file.

\$ wsnet -c configfile.xml

where **configfile.xml** contains the configuration of simulation.

Further details with possible options can be found at <http://wsnet.gforge.inria.fr/installation.html>

Simulation:

The WSNNet simulator uses an xml file to configure a simulation. This file describes the simulation setup and specifies, for example, the number of nodes to simulate, the libraries used to model the radio medium and the nodes (e.g., for propagation, routing, ...).

It is composed of five main sections: **global parameters**, **entities**, **environment**, **bundles** and **node**.

1. Global Parameters:

Definition

The definition of a simulation is done using the following syntax:



```
<simulation nodes="number-of-nodes" duration="simulation-duration" x="size" y="size" z="size" />
```

2. Entities

Definition

An entity is an instantiation of a dynamic library. The definition of an entity is done using the following syntax:



```
<entity name="entity-name" library="dynamic-library-name" >
  <init parameter-name="value" parameter-name="value" ... />
  <default parameter-name="value" parameter-name="value" ... />
</entity >
```

3.Environment

Definition

The environment block describes the radio medium and the physical environment of the simulation. The definition of the environment is done using the following syntax and order:



```
<environment >
  <propagation entity="entity-name" range="range" />
  <interferences entity="entity-name" />
  <monitoring entity="entity-name" />
  <modulation entity="entity-name" />
  <...>
  <with entity="entity-name" />
  <...>
</environment >
```

4. Bundle

Definition

A bundle is a node architecture. The definition of the bundle is done using the following syntax:




```
<bundle name="bundle-name" default="{true,false}" birth="time" />
<mobility entity="entity-name" />
<energy entity="entity-name" />
<antenna entity="entity-name" >
<up entity="entity-name" />
<...>
</antenna >
<with entity="entity-name" >
<default parameter-name="value" parameter-name="value" ... >
<up entity="entity-name" />
<...>
<down entity="entity-name" />
<...>
</with >
<with entity="entity-name" >
<up entity="entity-name" />
<...>
<down entity="entity-name" />
<...>
</with >
...
< /bundle >
```

5. Node

Definition

A node instantiates a bundle. Definition of a node is done using the following syntax:



```
<node id="node-id" as="bundle-name" birth="birth-time" >
<for entity="entity-name" parameter-name="value" ... />
<...>
</node>
```

Note:

For further details on How to write and setup an xml configuration file and How to write a new application module for WSNNet visit <http://wsnet.gforge.inria.fr/tutorial.html>.

For the purpose of simulation assignment we have chosen to simulate a data dissemination protocol during the event of a fire hazard.. This protocol can be seen as a probabilistic flooding algorithm. The protocol works as follows:

1. A source node broadcasts periodically a new data.
2. A sensor node which receives a new data (not received previously), broadcasts it again according to a given probability p , and stores it locally according to a given probability q .

We have used the library provided with the WSNets simulator for the purpose of this simulation.

The picture below depicts a network that uses the data dissemination protocol where a fire propagates, killing nodes that enter in the fire zone.

