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Mobility Influences on WSN Zigbee Network (Opnet Simulation)

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***Abstract*— This paper aims to discuss the influences of mobility on zigbee Wireless sensor network, in order to determinate the effective state that gives the best throughput**

***Keywords*— WSN, ZIGBEE; Mobility; e-Health**

I. INTRODUCTION

We Wireless sensors have resources such as processing speed, storage capacity, energy supply and communication extremely limited, there are some considerations concerning the network and coverage planning protocols and energy efficiency. It is self configuring, self-healing networks consisting of static sensor nodes or mobile connected wireless to form an arbitrary topology. Cover more ensures reliable communication, network connectivity higher, low consumption of energy and therefore more long service life of sensor nodes. The new method to treat these issues employs mobile devices carrying information collected by the sensor nodes. Different approaches to mobile devices in the WSN application were studied in detail in [1]. To simulate movement of mobile sensor nodes patterns, mobility models are used. As indicated in [2], it is important to consider the mobility adapted to the specific application model. The evaluation of the performance of a network of sensor taking into account different mobility patterns Protocol is demonstrated in [2].

Wireless sensor networks are widely used to access information about the physical world, in real time. Almost all areas of science and engineering noted the benefits of the use of networks of sensors [3], [4]. Wireless sensor network is a collection of large numbers of tiny sensor nodes. In the scenarios of time real smart sensors such as Berkley‟s nodes dust, µ-Adaptive multi-domain conscious power of sensors are deployed in static network. Since this network is a network of data centered on each node transmitted the information to the central node. The central node is nothing else than the sink node. The next evolution of wireless senor network is mobile wireless sensor networks. Mobile sensor network is designed to handle the mobility in all its forms. In this sink sensor nodes or nodes will be in mobile, or both mobile. Mobility makes the network to gather more data. Because in static networks, sensors, the sink node mobility and the monitored phenomenon are completely ignored. Based on the mobility of different applications models can be used and that they play a vital role in the collection of data.

II. MOBILITY IN WSN

There is a lot of attention is currently focused on the development and evaluation of routing protocols for wireless sensor networks wireless. This assessment has been played [14] using various simulators of networks (for example OPNET , ns - 2 and others) and synthetic models for mobility and data [12] modes. These models may have a great effect on the results of the simulation and therefore, the evaluation of these protocols. Some of the models, which are in consideration for my work, are listed below. This dynamic nature of sensor [1] mobile wireless networks, [2], [8] presents many challenges such as coverage, routing protocols, security, and management data. Static sensor networks discussed many of the problems associated to above challenges mentioned by researchers. But few researchers present addressed few problems for mobile sensor networks. One of the most important problems is the stability over mobility. Conventional routing protocols for static sensor networks must be optimized, once we introduce mobility. To study the performance of routing protocols in such conditions, consider the network mobility patterns.

A. Mobility for health care

We seek adequate representation for the application of medical follow-up. In fact, we must distinguish two types of mobility patterns: one for groups of nodes and one for individual nodes. There are not many studies that use different types of mobility on the same scenario. Among the models usually used for simulation studies, we find: Random Way Point (RWP), Random Direction (RD), Random Walk (RW), Reference Point Group Mobility (RPGM) [22, 27], Constraint Mobility (CM) [11]. In general, the traces generated by these models could resemble that seen . The nodes move freely in the field of simulation, the only restrictions are the walls. However, people do not move in this way in the indoor environment, due in particular to the presence of obstacles such as walls, doors, furniture, etc. There are several efforts that are intended to take account of these constraints to generate traces of mobility. These methods are to generate

a graph of mobility allowed by using the possible routes in a building. Among the techniques used, we can include: StraightSkeleton [3] and Voronoi diagrams and their variants.

III. MOBILITY MODELS

A. Random way point

It is a very simple model [5] based on the pause time between the change of direction/speed. Context a random point in the field of simulation with a uniformly distributed speed between [minSpeed, maxSpeed]. After his arrival to the destination again expected for the same period of time (pause time) before moving to a new place. According to [5,6], there are common problems with simulation studies using the Random Waypoint model due to wrong choice of distribution of speeds, a uniform distribution. If min is zero, this velocity distribution leads to a situation where the average speed approaches zero and steady state, that each node stops moving. Below figure 2 they described on the movement of a node of a random point model of mobility behavior.

B. Random walk

The random walk model mobility has been mathematically described by Einstein in 1926 [5]. Since many entities in nature move extremely unpredictable way, the random walk model mobility has been developed to simulate the erratic movement [9]. In this model of mobility, a MN moves from its current location to a new location by randomly choosing a direction and speed to go. The new speed and direction are both selected from predefined ranges, [speedmin; speedmax] and [0; 2□] respectively. Each movement in the random walk model mobility occurs in either a constant in the time interval t or a constant distance d, at the end of which a new direction and speed are calculated. If a MN moving this model reaches a limit of simulation, it "bounces" on the border of the simulation with an angle determined by the inbound direction. The MN continue in this new way.

C. Random direction

[5] Random Direction mobility model was created to address the average number of neighbors density waves produced by the Random Waypoint mobility model. A density wave is the grouping of nodes in a part of the simulation box. In the case of the Random Waypoint mobility model, this grouping is located near the center of the simulation box. In the RandomWaypoint, the probability of a MN mobility model, choose a new destination which is located in the centre of the area of simulation or a destination that requires travel in the middle of the area of simulation, is high. Thus, the MNs appear to converge, disperses and converge again.

random Direction mobility model has been developed [7]. In this model, MNs choose a random direction in which to go similar to the random walk mobility model. A MN then went to the border in the area of simulation in this direction. After reaching the limit of the simulation, the MN pauses for a specified time, chooses a different angular direction (between 0 and 180 degrees), and continues the process.

IV. SIMULATION

To simulate a ZigBee network, OPNET proposes models of peripherals for the ZigBee coordinators, routers and end devices , in both cases mobile and fixed nodes . Main goal of the simulation of network is to analyze the performances of a ZigBee network in a mobile WSN context . Nodes mobility can be random as it can be following a mobility model as those explained before . This section will discuss the results of some OPNET simulation of 3 differents cases , fixed nodes model , random node mobility and random way point mobility model , in order to discuss a comparasion and see how can mobility disturb a WSN network performances .

Network description

In this article the performance analyse is for a tree topologie by using various mobility models. The number of nodes taken are 22 . With the folowing configuration :

Table I : Attributes description

Attributes	Values
Packet Interval Time (sec)	Constant (1,0)
Packet size (bits)	Constant (1024)
Carrier Sensing Duration	Constant (1)
Start time	Constant (1)
Packet Reception Power	-85
Number of end devices	16
Number of routers	4
Number of coordinators	1
Simulation Duration	600

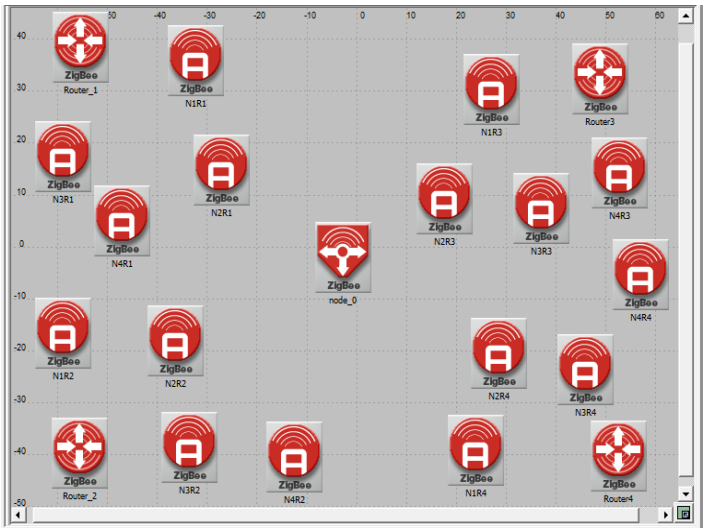

Figure 1: Network architecture

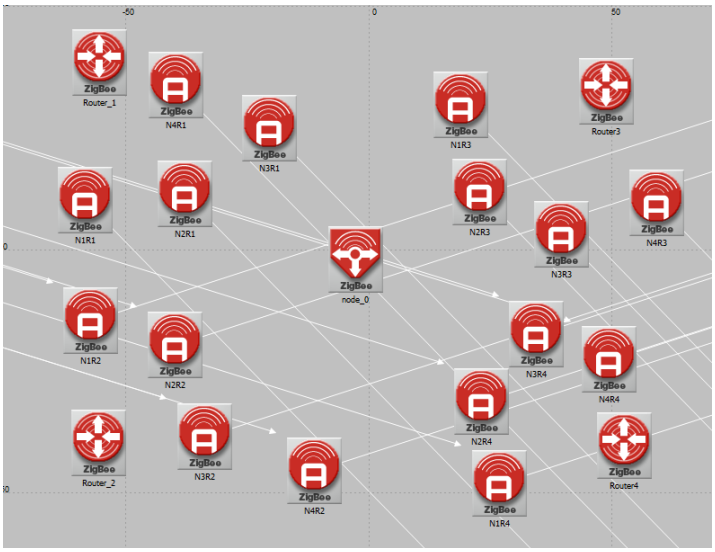

Figure 2: Network mobility model

V. RIESULTS

1) Throughput:

Throughput is the total number of bits (in bit/s) transmitted by 802.15.4 MAC to upper layers in all nodes the network WPAN. It is considered as the most important metric in network performance evaluation .

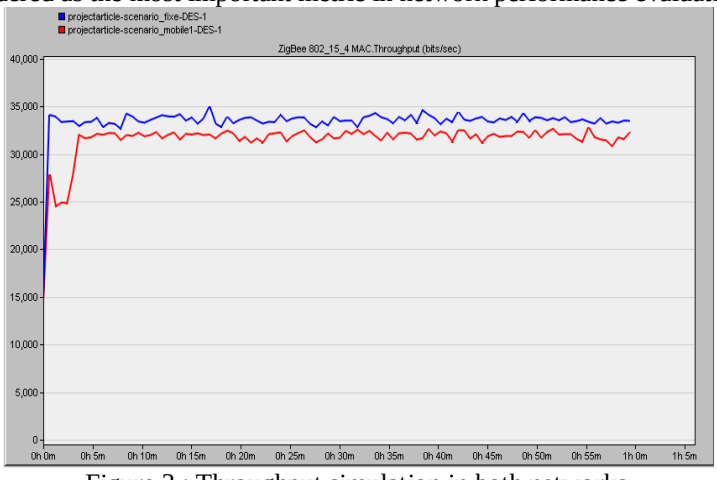

Figure 3 : Throughput simulation in both networks

2) Traffic received:

Application traffic received by the layer in bits/sec. This statistic is dimensioned by ZigBee Network (PAN ID) forvalues of PAN ID ranging from 1 to 255.

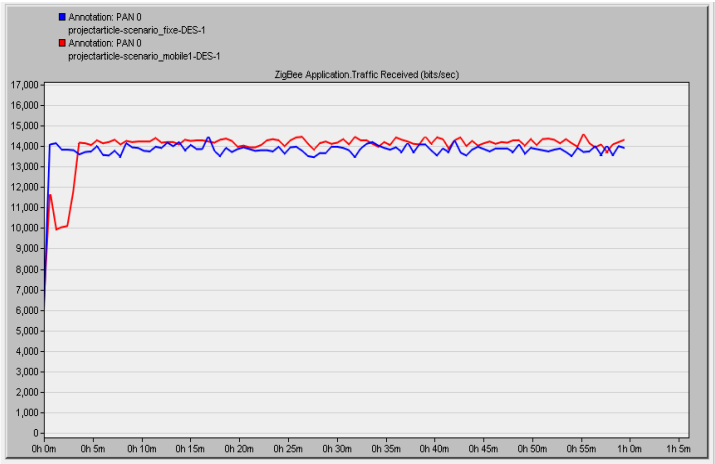

Figure 4 : traffic received simulation in both networks

VI. CONCLUSION

Mobility effects the performance of the WSN network.

It remains very important to find a suitable mobility model that gives better performance this according to the network application . After simulation it has shown that any kind of mobility will influence the performance of the network.

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