Resume

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1 Networks generation

In this section, and at first, we created a tool that generates WVSN networks of 10 nodes each, randomly located in a square area of 50m x 50m. Node 10 is the Sink, the others are video sensors and all nodes can send to the Sink. Each node has a transmission range of 30 meters, so in our tool we are seeking to maintain these conditions so that the network is connected and the nodes that can communicate are distant less than 30 meters.

2 Implementation of networks

In this section, we will test the networks, generated in a network implementation tool (OMNET++) to visualize and evaluate the convergence of the distributed algorithm designed to maximize the lifetime of implemented WVSN network.

Networks are tested in synchronous mode, and then asynchronously. We collect the primal variables that characterize a WVSN network after 400 iterations, and finally an analysis is made of these results:

2.1 Synchronous mode

Synchronous mode consists of ensuring that each node makes as much iterations as the others in the same given time. This is done when a given node increments the number of iterations when receiving acknowledgment messages from all its neighbors when they meet a Message already sent before.

2.2 Asynchronous mode

In asynchronous mode each node can make a number of iterations that differs from another node after a given time. Node increments the number of iterations when receiving acknowledgment messages from its neighbors, but not necessarily all of its neighbors for example 50

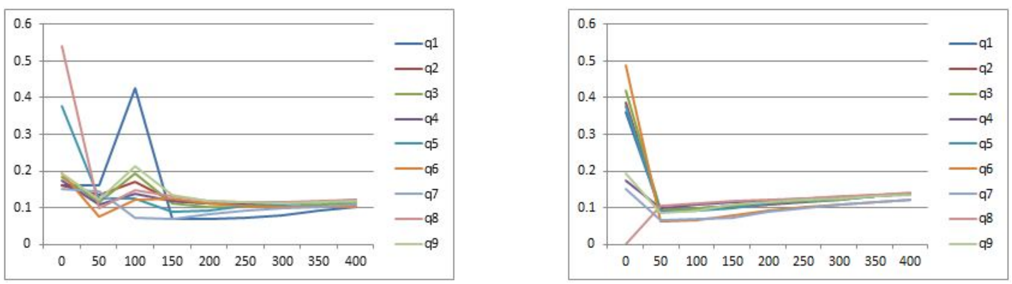
3 Analyses and results

3.1 Interpretation

After testing a series of WVSN networks and based on the results obtained in our experiments, we noted that in some cases and in two modes: synchronous and asynchronous the auxiliary variables values (qi) in the nodes are almost close from each other as shown in fig1.a and fig1.b and in other cases these values are distant as in the fig2.a and fig2.b.

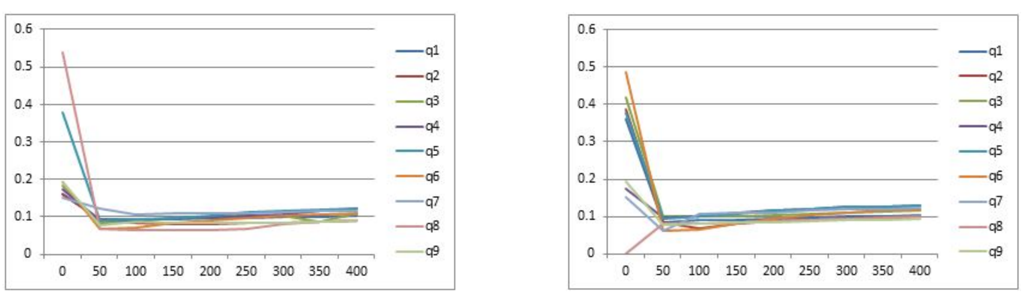
Furthermore, we noted in Fig 1.a (Synchronous mode) that the variation after 400 iterations between the qi variables is 17.8

On the other hand when the qi values are not near each other in some tests, and after 400 iterations (fig2.a, fig2.b) we noted that when applying the two synchronous and asynchronous modes, we almost got the same results, fig2.a: 38



(a) synchronous mode (b) asynchronous mode

Figure 1: qi variations with the iterations(test1)



(a) synchronous mode (b) asynchronous mode

Figure 2: qi variations with the iterations(test2)

3.2 Conclusion

We can conclude from the above that the final results of the convergence conditions obtained are almost the same in the two synchronous and asynchronous modes. However, the synchronous mode is more efficient in terms of time to reach convergence.

In addition, Fig 1.b (asynchronous mode) shows the stabilization of qi after 50 iterations which is not the case in the asynchronous mode (fig1.a) which there has been a remarkable fluctuation in the same interval.

So finally to achieve our main objective to maximize the lifetime of a network WVSN it is better now to consider the asynchronous mode to avoid time lost in the synchronous mode because each node waits for all the neighbors to respond for incrementing iterations and then extend the life of the network in the best delay.