Choice Of a Specific Path To Ensure Transmitting Data With No Wasting In The Power Of Nodes

Dr. Mahdi S. Almhanna
University of Information Technology and Communication
Dr.mahdi@uoitc.edu.iq

Mr. Saif Ali ALSaidi
Wasit University
salsaidi@uowasit.edu.iq

Dr. Rafah M. Almuttairi
University of Babylon
rafah@uobabylon.edu.i

Abstract

The optimization of Transmission power is a significant indicator to extend the period and maintaining the networks quality connection. without optimization, nodes perhaps fails to connect with its neighbor. the main goal of the current article is reachability of data to the destination. It focuses on the energy which is already available in the node. this model, Trying to send data to its goal using the safest path for the purpose of avoiding unnecessary loss of energy .

ان تحسين انتقال الطاقة هو مؤشر هام لتمديد عمر الشبكة والحفاظ على استمراريه اتصال الشبكة وجودتها. بدون تحسين الطاقة للعقد ضمن الشبكة فان العقد ربما تفشل في الاتصال مع جاراتها (العقد الاخرى). ان الهدف الرئيسي من هذا البحث هو دراسة إمكانية توصيل البيانات إلى وجهتها (المستلم). ان هذا البحث يركز على الطاقة الفعلية المتوفرة في العقد او في السيرفرات فهو يقوم بإرسال البيانات الى الجهة المستلمة من خلال اجبارها بالمرور بممرات امنه و تجنب الممرات التي لا تحتوي على الطاقة الكافية لنقل البيانات الى المستلم وبالنتيجة فان هذا سيجنبنا مشكلة فقدان الطاقة دون الاستفادة منها في وصول البيانات الى وجهتها

Keyword: power consumption, energy efficiency, Wireless Sensor Network, and routing protocols.

1. Introduction

In many cases, stations of sending data are distributed in certain areas, These areas must be well distributed in terms of the environment as well as geographical distance between station and others, whenever the distance between the stations is short will lead to reducing the energy consumed for the purpose of sending information among themselves. Other factor (geographical environment), whenever the place is overcrowded means overtime working, leads to more power consumption. Weak reachable occurs, when connectivity of network is weakly, from other side, rising connectivityconsumes more power, therefore, reduce the service quality [1].

Let assume that the first factor (distance between stations) has a constant distance, or calculated distance so that this factor not affected on the quality of network, therefore, Second factor will be effective one. in other word, consumption of station for energy differs between station to another depended on the number of hours working.As a result, failure of sending data to the adjacent station if the node has no enough energy for sending that information, therefore, the wasting of energy consumed occurs in all the stations which passed the data before losing, this also leads to wasting the time taken for the purpose of sending those data in those stations before losing.

So, the data must be send from sender to the recipient using specific path, so that, all the stations on that path have enough power to send that data in order to avoid losing.

This paper, clarified simple method for the purpose of sending data in a path determined in advance before transmission data,so that, all stations in that path have enough energy to send that information or data to the destination.

1.Regulation:

The rest of this paper is organized as follows: in Section 3, an introduction about Wireless Sensor Network. In Section 4, the problems in WSNs" workload on sensors" In Section 5, Working Explanation and Algorithm, In Section 6, case study, In Section 7, conclusion, and In Section 8,refrences.

2. Wireless Sensor Network " WSN"

WSNs solved the problems for multiple applications, such as target detection, environmental monitoring, automation of industrial, military and medical systems, and more others [9]. huge amount of nodes are deployed in a region In wireless sensor networks. Each one is eligible of sense and deliver data, these nodes communicate through wireless to shape a network topology. The node transmits data to data sinks in two way directly or indirectly. Direct delivery is not suitable all the time because of needs to the battery power which cannot build a lineal link with the sinks. Indirect, is ideally in wireless sensor networks. Like this environment topology with full reachability is attractive.

3. Workload on sensors

WSN is a distribution system collected huge of sensors [3]. the power supply for sensors is Battery power in a WSN. Multiple protocols have been introduced to minimize the consumption of energy and enhance the lifetime of WSNs [11]. Most of them are not energy efficient and thus the lifetime of WSNs not improved. power consumption, scalability, mobility, etc. all those problems effect on the networks lifetime, it may reduce the throughput and increase the latency.

Limited power leads to problems in data transferring, which cause failure of node [10]. Consumption of power and load of sensors are unstable. Also, the power and transmission range of nodes are finite. The mission of a wireless sensor network is monitoring and control. Because of deployment conditions the maintenance, replacement, and charging of node is rare. Rendering of the network will be affected when the power is wasted. Therefore, Quality of Service "QoS" provides settled and expectable propagation quality requirements for users.

QoS easily affected by quality of link. The crowded links leads to interference on channel, while some links fail in reach to the destination. Recently, the researches on QoS [4] proposed to build an good WSN via topology control [8] and algorithm of routing [5, 6]. The classic evaluation index of QoS is specified by latency, lack and throughput of data in transmission. Therefore, the energy efficiency of nodes and reachability became serious case in QoS [7].

WSN not work properly if its sensors has frequently powerless, this will affected on the Lifetime of network. This dilemma implies that the network existence is linked to the energy of nodes. In this proposed, we monitor the power of nodes for solve the problem of reachability through compulsion the data to pass within safe path.

Conventional methods or those methods that rely shortest distance by calculating the number of nodes between the sender and recipient are not guarantee arrive data to its destination. And therefore loss in power and time, two factors are very important if the specification of information have higher confidentiality and urgent nature.

In this paper. there is guarantee for availability of energy required for data transfer.

4. Working Explanation

The network services can provide some services about the nodes connected in the network such as the amount of energy in the battery say "#", also how much time needs to send a specific file or how much the size of that file, which mean the amount of consumed energy required to send a specific information say "X."

Assume the distance between nodes is fixed, so the node can send data to any other adjacent nodes by consume approximately same amount of energy, but, perhaps the battery in some node has no enough power to send data to the other adjacent nodes, in other word # -X < 0. So, if data sent to a path has a node where x > # then this data does not send to the adjust one and will discarded .

It's better to check all power nodes before sending the data, and then a maximum power path is chosen to send data. The following algorithm includes steps of implementation above schema.

. **Algorithm**:

. **Start**

Step a: Read #(S_i), where i={1,2,3,…n}, n: number of nodes, S: a network node, and "#" represents the power of a node/* read power of node i.

Step b: Read "X", where X is amount of power required to download or send file.

Step c: If (X > # (S_i), then (# (S_i), =∞). Otherwise, # (S_i), = 100 - # (S_i),

Step d: Let A= {S_i}, B= {ϕ}

Step e: B=B+ S_1 where S_1=source node

Step f: A=A-S1,

Step g: Select a node S_i, S_j so that S_i ϵ A, S_jϵ B where S_i connects with S_j and Sj= min {S_i+ w (S_i, S_j)}, where w : represents cost of the path

Step h: A=A-S_i , B=B+ S_i,

Step i: Add the edge (S_i, S_j) to the shortest path

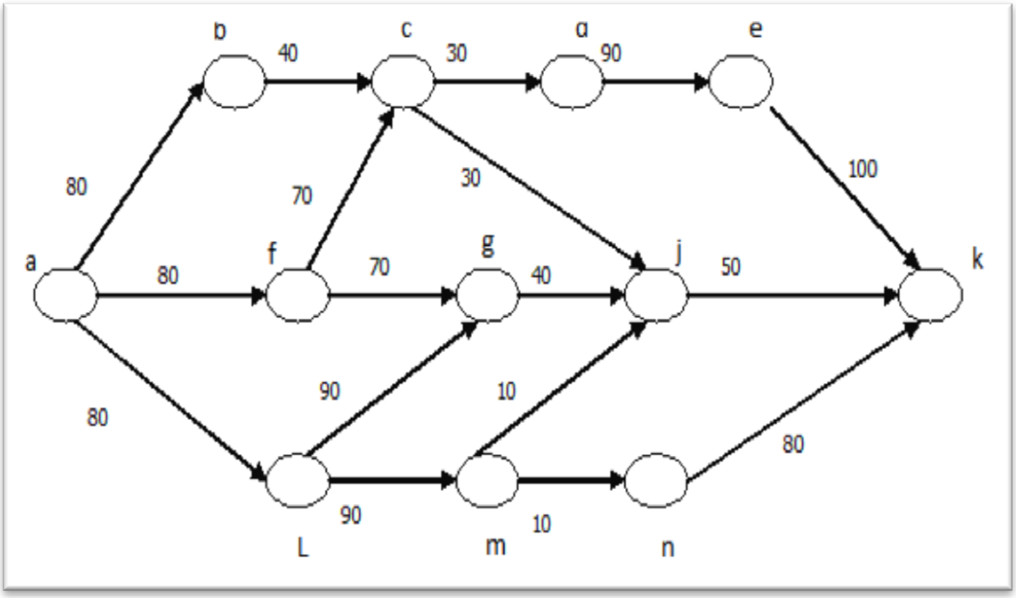
Step j: If A ≠ ϕ then go to step g

End

5. Case study

Assume we have the following net and all the amount on the nodes are the percentage of power value in the battery on that node. Where

Step a: # (S_a)= 80 , # (S_b)= 40 , #(S_f)= 70 ,…., # (S_e)= 100 , # (S_j)= 50 , and #



(S_n)= 80.

Figure (1): Network with amount of energy for each node.

Step b: Assume sender "a" wants to send information to the destination "k" and this information needs less than 10% from the power of battery, which mean " X<10."

Step c: compare between the value of X and # (S_i), if (X > # (S_i), then (# (S_i), = ∞). Otherwise, # (S_i), = 100 - # (S_i). In our example all the power of nodes will change theoretically to the new value # (S_i) = 100 - # (S_i). Because X< # (S_i).

Step d, Step e, Step f, Step g, Step h, Step i and Step j are used to find the shortest path (Minimum power).

In our work ,we find the minimum path cost is " a f c d e k "as shown in the Red arrow, in fact, it's a best path with maximum power = 100 + 90 + 30 + 70 + 80 =370 unit.

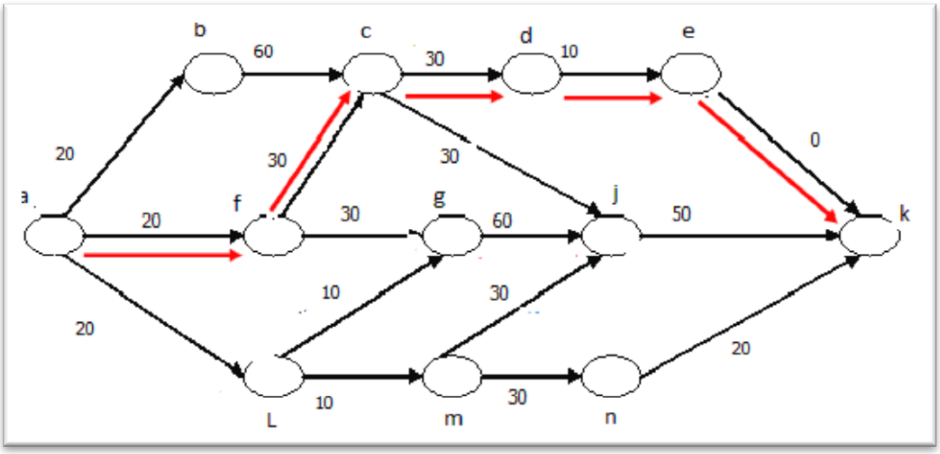


Figure (2): The best path before processing.

Now let us assume that the data to be sent required more than 30% power, X=30%. What is the taken behavior? The first step is to change all the values less than 30% to the infinity, and all others amount by subtract from 100%.as shown below in figure (3). And then run the Algorithm to find minimum cost, so the result will be

"a l g j k" as shown in red arrow below. This path represents maximum power and if the data travel with this path will guarantee arrive to its goal.

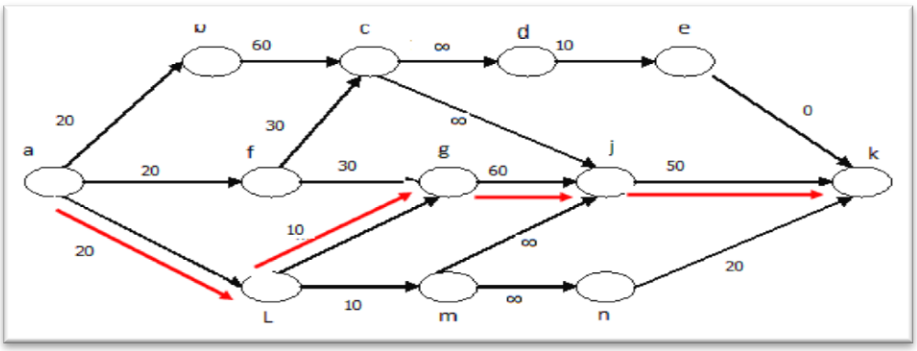
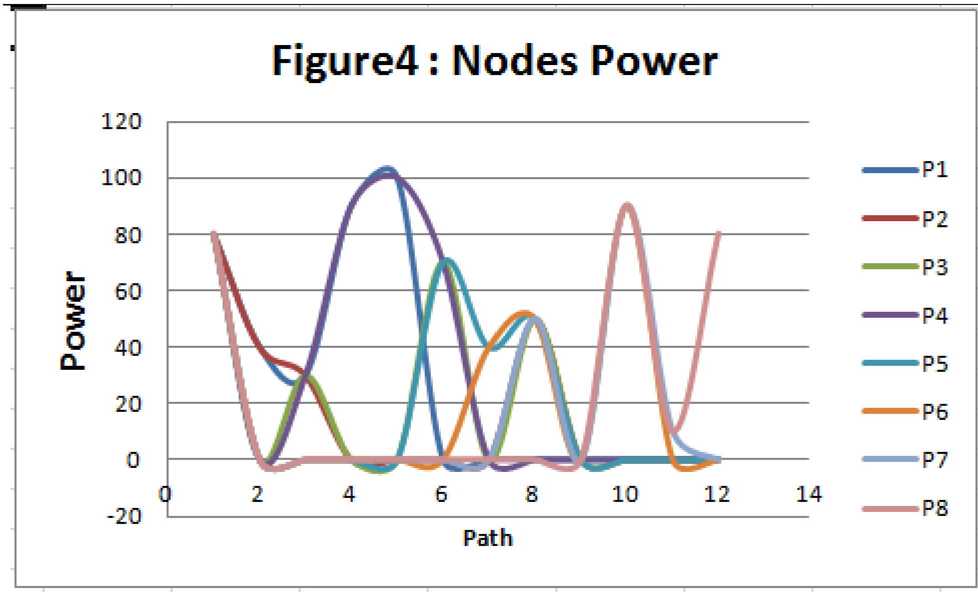


Fig ure (3): The best path after processing.



The hurdle of this method is, although the overall cost of this path (the power of all batteries on the chosen path) greater than the summation of the power of any other path leads to the same goal, but there is no guarantee that all nodes on that path have a maximum power individually, but, nevertheless, the advantage is, at least has enough power for traveling to the goal.

Before processing:

Number of paths from "a" to "k" are 8 ways as shown below.

Path1=a b c d e k =80+40+30+90+100=340 unit

Path2=a b c j k =80+40+30+50= 200 unit

Path3=a f c j k =80+70+30+50=230 units

Path4=a f c d e k =80+70+30+90+100= 370 units

Path5=a f g j k =80+70+40+50=240 units

Path6=a l g j k =80+90+40+50=260 units

Path7=a l m j k =80+90+10+50=230 units

Path8=a l m n k =80+90+10+80=260 units

As we can see the maximum power with fourth path = 370 units.

After processing:

Path1= {a, b, c, d, e, k} =80+40+ ∞ +90+100= ∞

Path2=a b c j k =80+40+∞ +50= ∞ unit

Path3= {a f c j k =80+70+ ∞ +50= ∞

Path4=a f c d e k =80+70+∞+90+100= ∞

Path5=a f g j k =80+70+40+50=240 unit

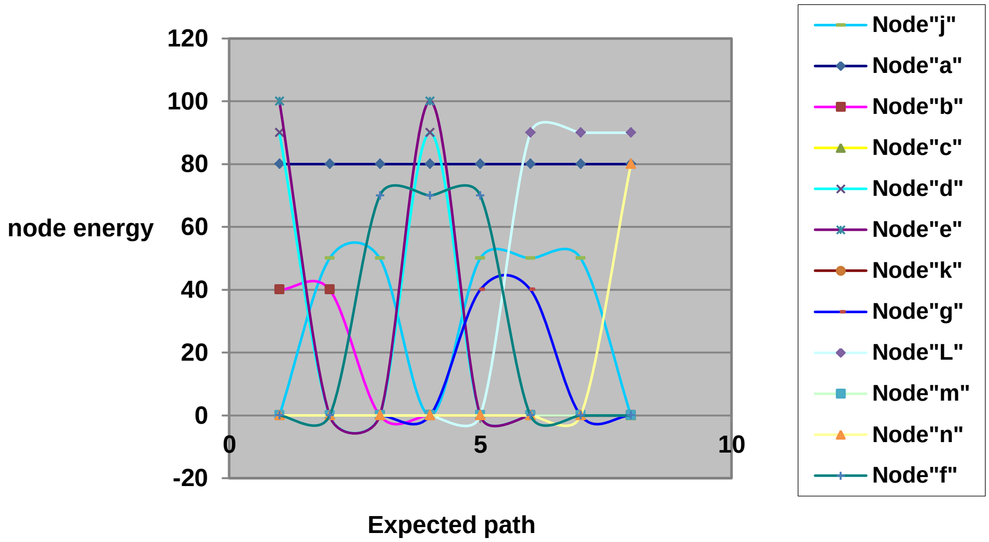
Path6=a l g j k =80+90+40+50=270 unit

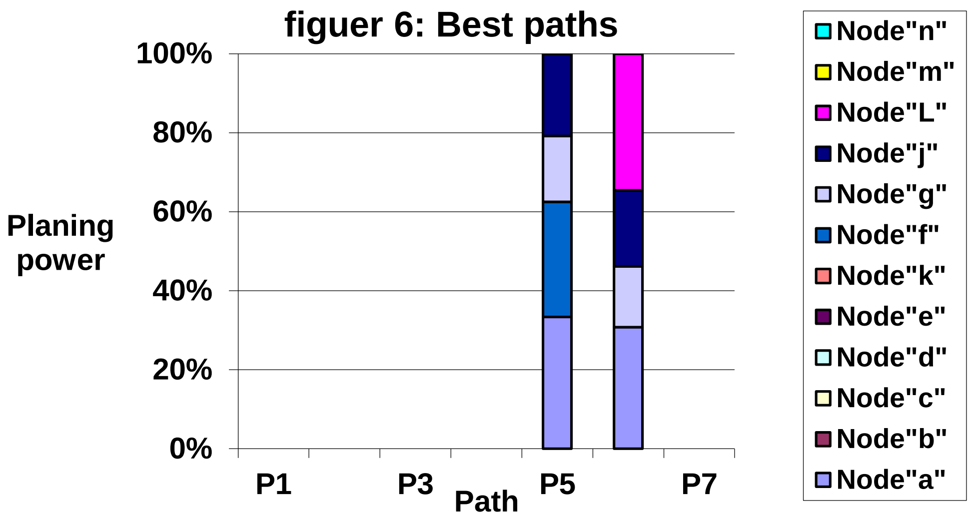
Path7=a l m j k =80+90+ ∞ +50= ∞

Path8=a l m n k =80+90+ ∞ +80= ∞

The maximum power is represented in Path6, where all infinity paths such as: Path1,Path2, Path3, Path6 and Path7.will be discarded.

Figure5: Path situation





6. Conclusion:

The message may not travels to its goal due to the dependency of this issue on several factors such as bandwidth, congestion, or even no enough power to send that message to destination. That means, if data travels through its path to the destination may not arrives to its goal due to the power needs. To deal with this type of quandaries, in this work, the specified path has been suggested to guarantee the data arrival to its destination. This is done by reading the properties of the path before sending the message and make sure that data travel within this path. This method will allow the data to travel to its destination in guarantee manner. The use of the newly introduced technique in this work has been shown that a significant performance improvement is achieved.

As far as the provision of energy, apart from the rest of the factors that affect the data flow and transmission, The introduced method in this work improves the performance of the implemented network with about 100% guarantee that the data will get its destination in comparison with others.

7. Reference:

1. Deng J., Han Y.S., Chen P.N., Varshney P.K. Optimal transmission range for wireless ad hoc networks based on energy efficiency. IEEE Trans. Commun. 2007;55:1772–1782.
2. Seba, H., Lagraa, S. &Kheddouci, H. Alliance-based clustering scheme for group key management in mobile ad hoc networks J Supercomput (2012).
3. sink Sharma, S., Puthal, D., Jena, S.K. et al. Rendezvous based routing protocol for wireless sensor networks with mobile J Supercomput (2016).
4. Horng M.F., Chen Y.T., Chung P.W., Shieh C.S., Pan J.S. An adaptive approach to high-throughput inter-cloud data transmission based on fast TCP. J. Internet Technol. 2012.
5. Shin, K. & Kim, S. Predictive routing for mobile sinks in wireless sensor networks: a milestone-based approach J Supercomput (2012) .
6. Naranjo, P.G.V., Shojafar, M., Mo-stafaei, H. et al. a prolong stable election routing algorithm for energy-limited heterogeneous fog-supported wireless sensor networks. J Supercomput (2016).
7. Liu, M., Cao, J., Zheng, Y. et al. An energy-efficient protocol for data gathering and aggregation in wireless sensor networks J Supercomput (2008) 43: 107.
8. Brante G.G.D., Kakitani M.T., Souza R.D. Energy efficiency analysis of some cooperative and non-cooperative transmission schemes in wireless sensor networks. IEEE Trans. Commun. 2011.
9. Meng W., Xie L., Xiao W. Optimality analysis of sensor-source geometries in heterogeneous sensor networks. IEEE Trans. Wirel. Commun. 2013.
10. Joshi Y.K., Younis M. Autonomous recovery from multi-node failure in Wireless Sensor Network. Proceedings of the IEEE Conference on Global Communications Conference (GLOBECOM); Anaheim, CA, USA. 3–7 December 2012; pp. 652–657.
11. Razaque A., Elleithy M.K. Least Distance Smart Neighboring Search (LDSNS) over Wireless Sensor Network. Proceedings of the IEEE Conference on European Modeling Symposium (EMS); Manchester, UK. 20–22 November 2013.