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A Survey of Dual mode energy driven protocol in wireless sensor networks

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Abstract: Planetary Exploration is the Exploration of the planetary system,To find the information about the planets and its environment and its physical and chemical and biological conditions and its different characteristics.Now a days different protocols are to be used in the wireless sensor network for the planetary exploration but energy efficiency is the main problem in the wireless sensor network.Adhoc on demand distance vector routing protocol is the one of the commonly used protocol in the wireless sensor network but it has several disadvantages like high rate of energy consumption, unnecessary bandwidth,difficult to handle data congestion.Adhoc on demand distance vector routing protocol is the reactive protocol its routing path is based on the ondemand basis.Main objective of this paper is to implement a dual mode energy driven routing protocol for improving the energy efficiency and energy balancing in the wireless sensor network for planetary exploration.

1. INTRODUCTION

Wireless sensor network is the most effective network for the planetary exploration and mars exploration.Wireless sensor network has more number of benefits compared to other networks. Energy efficient is the challenging issue in the wireless planetary Exploration.The main objective of this project is to survey the information about the dual-mode energy-driven(DMED) routing protocol for the Planetary exploration. The Rechargeable solar batteries equipped in the planetary surface Sensor system for maintaining the energy efficiency. DMED does not maintain multiple path simultaneously.Therechargable solar battery is in charging state under the day mode.The association of the energy driven routing mechanism can balance the energy of the nodes effectively. Planetary explorationis the timeline of solar system exploration ordered by date of space craft Launch. Exploration is the process of searching for discovery or innovation of information

. All space craft that have left earth orbit for the purpose of solar system exploration. Energy-Efficient is a challenging issue in wireless sensor Network, which is a promising technology being widely used in the planetary exploration.According to the charging and sleeping states of the solar battery, the day mode and night mode of the node are obtained.

The day mode and night modes are the dual modes in this protocol. The wireless planetary exploration sensor network model is constructed based upon the special planetary environment. This paper includes detailed study of the DMED protocol which helps in maintaining the energy in the planetary exploration .

Planetary condition is very difficult and challenging different environmental and climatical conditions such as energy, density and special temperature.To detect the environmental conditions wireless sensor network is to be used.In the wireless sensor network contains the different spatially distributed autonomous sensor nodes and every sensor node is sensing and detecting the environmental conditions such as pressure,sound,temperature etc .The dual mode energy driven routing protocol is for improving the energy efficiency with energy balancing considerations.DMED protocol is specially developed for the special environmental conditions and the planetary surface sensor system is mainly contains the two modes, day mode and night mode.The planetary surface sensor system is embedded with the highly solar powered sensor node and it is charging in the day mode in the day time and sleeping in the night mode in the night time.

DMED protocol use the energy in the optimal and the efficient way.There are different sources of energy such as solar energy,wind energy.

DMED mainly uses the solar energy which is the most useful and important renewable energy resource.Solar energy comes from the sun in the reaction of thermo nuclear fusion. Sensor nodes are different types in the planetary surface sensor system used for gathering and accquiring the solar energy.

DMED improves the network life time efficiently and effectively.In the case of DMED energy utilization and energy consumption is decresed effectively with the strategy of combining the circular path and the shortest path.The routing mechanism balances the energy among multiple paths and different paths.

Battery and the solar energy are the two different types of the energy source in the solar systems.In the case of

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vibrate and thermal energy are very difficult to harvest.There are several technics to be used for the battery resistance performance with special temperature.According to the mars exploration rover,there are mainly three lands of space craft battery system.Rechargeable battery,landers primary battery back shells and thermal battery these are the widely used batteries in the space craft systems.The researchers shows that lithinum ion rechargeable battery is lighter and more compact than the conventional batteries.Lithinium ion rechargeable battery system are used in the planetary surface sensor system.

II .DAY MODE IN DMED

Solar energy which is the energy from the sun is the important and most efficient renewable energy resource.In the planetary surface sensor are the autonomous sensors and at the same time it is performed as efficient solar batteries and the day time solar batteries are to be charged.At this time find the optimal shortest path between the source node and sink node and this time routing stable stable is the key design .

III. NIGHT MODE IN DMED

Maintaining the energy as the key design point in the case of dark or night mode.In the case of night mode energy of the nodes dropped sharply because each node in the planetary device surface sensor is energy challenged.
DMED maintains and controls the node energy with the help of energy balancing.Energy balancing is the one of the most important criteria in DMED.

IV. WSN MODEL OF PLANETARY EXPLORATION

WSN model of planetary exploration consist of different systems.The important systems are the satelite sensor system,Planetary surface sensor system,event management system and internet.Planetary surface sensor system is embedded different sensor nodes and these nodes are equipped in the day and night mode .The network node deployment can be controlled.
The Wireless sensor networking model for planetary exploration system is as shown in the following figure 1. The networking in the planetary system performed by the self –organized and self structured way and the data is to be transferred to the data processing center in the earth.Each and every communication range in the planetary exploration system is limited and the data transmission in a multi hop way.High performance is required the sink node and the energy is to be infinite.
Different types of systems in the WSN model of planetary exploration.

1.Satelite sensor system.
2.Planetary surface sensor system
3.Event management system
4.Internet

The planetary surface sensor system is the most important and challenging model. In this survey paper which illustrates the working of in dual mode energy driven protocol such as battery charging mode and battery sleeping mode these modes are referred to as charging mode and sleeping mode.

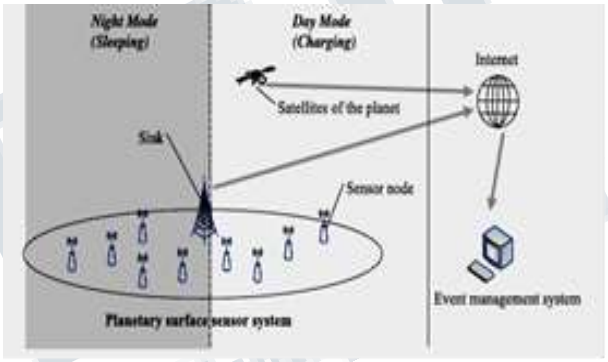

Figure 1: WSN model for planetary exploration

V. DMED ROUTING PROTOCOL

Improving the computational and communication quality and energy balancing and maintaing in the whole network are the main objective of the DMED routing protocol.DMED protocol mainly contains different mechanisms .

1.WAR routing consultation mechanism
2.Multi-Route Request Processing mechanism
3.route checking mechanism

VI. WAR ROUTING CONSULTATION MECHANISM

The Key design of the WAR routing mechanism is improving the computational and communication quality and the energy maintaining and balancing.In this method first to find the shortest path in the communication network and the energy of the each and every nodes in the network and next to find the remaining energy of the intermediate nodes and these value are compared in the path finding process then it is checked with the later

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routing table and it is less than the the routing table of the networking system should be updated.If the Route Request message(RREQ) and Route Reply(RREP) messages reach their destination then the minimum residual energy is to be calculated.

The Routing Consultation process is between the energy of the each and every nodes and the hop counts of the nodes.DMED uses the Weighted Average Of Reciprocal mechanism to find the finite computing ability of the sensor nodes.

Routing Consultation is the different step by step procedure and it is described in this mechanism using the mathematical formulas.In the routing Consultation contains the i(iϵN=(2,3,...N) paths and pi indicates the i path and Ei indicates the minimum nodal energy and Hi is the no of hop count and wi is the weight of pi.This routing consultation method is referred as WAR.The weight of Wi=pei+q1/Hi,where p and q denoted as the weighted coefficients and p+q=1 then wi=pei+(1-p)1/hi DMED finds the optimum path according to its energy and according to its hop counts and the generator ratio of p is described as 1/Hi+p(Ei-1/Hi).In dual working mode p is adjusted beween the working of two different modes.The value of p will impact the routing choice. when p=0 then the AODV routing process will be obtained.In this type AODV is the special case of DMED.

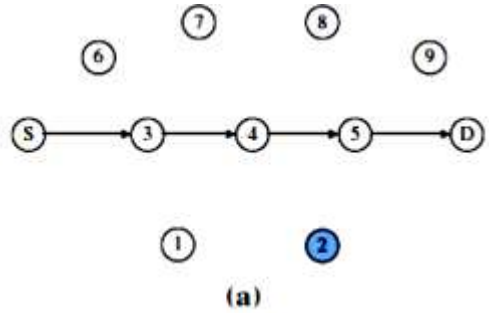
VII. MULTI ROUTE REQUEST PROCESSING MECHANISM

Energy is the factor in the DMED routing protocol and energy is involved in the path weight calculation of WAR. DMED handles the RREQ messages and the multi route process request processing mechanism only effects the destination node so the original RREQ broadcast time not to be increased.The request processing mechanism ensures that there is no repeated loop among the multiple and different paths and it is no repeated node in the network

VIII .ROUTE CHECKING PROCESS

DMED does not maintain the multiple paths or different paths at the same time .If the data transmission are large then there are several problems like the energy of the working mode some times will be cut down and in the case of energy consumptions the nodes will be invalid.Because of this problems a regular route checking mechanism is to be needed.

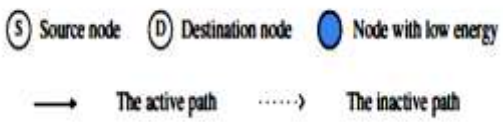
In the DMED route checking mechanism if the number of data packets which have been successfully transferred are reached successfully to the certain value then the RREQ messages are requested to rebroad cast once and the route finding process is to be restarted.This is known as route switiching principle and the DMED maintains the optimal routing effectively and efficiently.



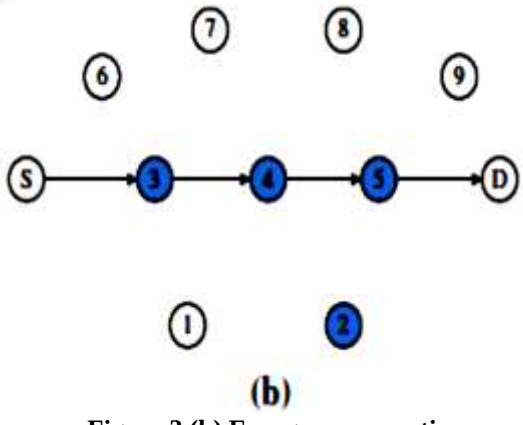
(a)

Figure 3: The regular route checking mechanism

(a)The first path finding process



The Figure 3(a) shows the regular route checking mechanism and it first compute the path and the energy is selected after the route finding process.In the first step,to find the shortest path between the source node and the destination node In the first step remaining nodes does not participate in the communication.



(b)

Figure 3 (b) Energy consumption

The Figure 3(b) shows the energy of the nodes,in this figure node 3,4 and 5.If they are working long time with this path the path is decresed shortely then the path is not suitable for the data transmission of the data packets.

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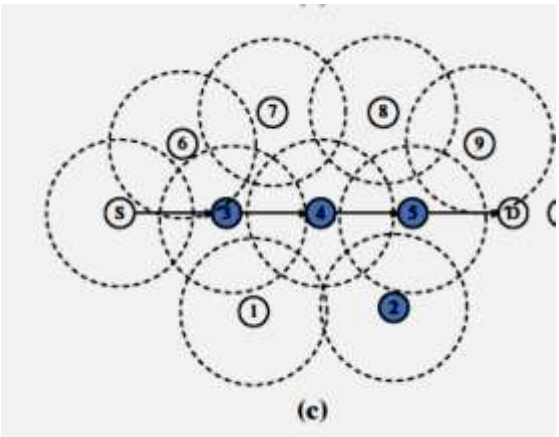

Figure 3(c) The regular broadcasting mechanism

Figure3 (c) shows the regular broadcasting mechanism and it helps to maintain the energy consumption in the different nodes.In this step DMED recalculates the value of weighted average of reciprocals and to find the optimal and suitable path and this path will be choosen as the next path.

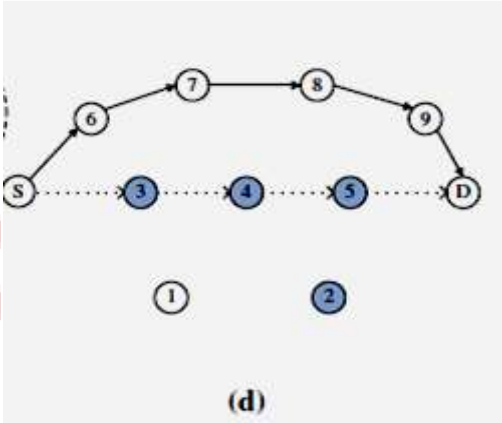

Figure 3(d) The Route Switching Process

Figure 3(d) shows the route switching process and S->6->7->8->9->D is the path in the figure.The path which is shown in the figure is the optimal path and it is based on the route switiching principle.Due to the Route checking process, DMED maintains very efficient and nice energy balancing performance.

IX. DUAL WORKING MODE

In both the day mode and the night mode the energy of the nodes is consumed persistently even if the nodes does not participates the communication.The examples are given below.

- The Procedures of Sending
- Receiving and Forwarding the data need to consume the energy

Dual working mode is developed for adjusting the route finding process.The rechargeable solar batteries are charging in the day mode and sleeping in the night mode then the association of energy driven routing mechanism can balance the energy effectively and efficiently.At this time route finding process is to find the shortest path and the communication quality can be improved by the appopriate p value in the WAR function

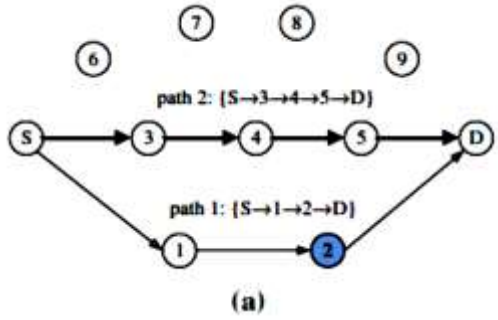

Figure 4(a): The path finding process under the day mode

Figure 4 describes the path finding process under the day mode .Node 2 is the lower energy node in the figure and the path1 {S->1->2->D} can be the alternative path because it has the minimum hop counts.

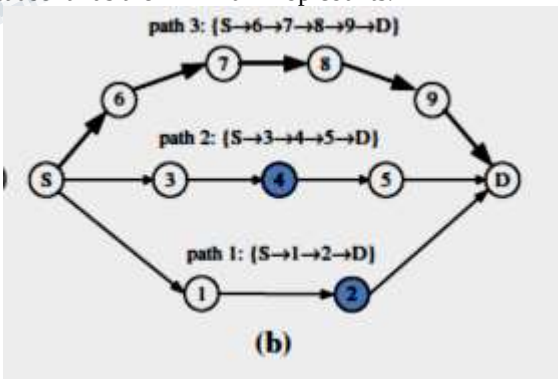

Figure 4(b)The path finding process under the night mode

Figure 4(b) shows the path finding process under the night mode.Under the night mode there is no solar energy for battery charging so the energy of each node is dropped sharply.To avoid this problem the route finding process under the night mode is to distribute the traffic

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burden into more nodes.In this the path which has the sufficient energy is inclined to be chosen.
The energy of the node 2 is not enough and path 3 is to be find the optimal one according to the WAR routing consultation mechanism. S->6->7->8->9->D is the optimal path in the figure 4(b).When dealing with the three route request (RREQ) messages under the night mode,the route is to be switched one or two times to find the optimal one with enough energy and this real time routing process does not affect the data transmission process.

X .EXPERIMENTS AND ANALYSIS METHODS

In this paper the performance of the AODV is compared with the DMED and the analysis and the experiments shown that the DMED routing protocol is the most useful and mose effective routing protocol in the conventional wireless sensor networks and it helps to improve the energy efficiency and to maintain the energy balancing in the wireless sensor networks.

Table 1 The Simulation Settings

Simulation parameter	value
Simulation	NS-2(version 2.35)
Channel	Wireless
MAC layer Protocol	802.11
Network range	1.500m*1.500m
Number of nodes	150
Initial energy of each node	15 nj
Maximal transmission range	250 m
Radio propagation model	Two ray ground
Maximal packet rate	60
Packet size	1024byte
Traffic type	CBR(constant bytes rate)
Mobility model	Random way point

The Simulation settings and the simulation parameters are described in the table1.The experimental Tool is NS-2 it is the most important simulation tool which is universally accepted multiprotocol simulation software and it is developed by the DARPA and it is supported by the Virtual InterNet TestBed.The radio propagation model we use two ray ground and it is commonly used in the mobile scenarios.
There different types of simulation tools is to be used.NS-2 and NS-3 simulation are most important simulation tools.Simulation is the process of simulating the real word process.

XI VALIDATION OF ENERGY BALANCING

The energy balancing considerations of the AODV is shown in the figure.In the experiments the simulation scene is taken as 500 then the day mode and night mode occupy 250 respectively

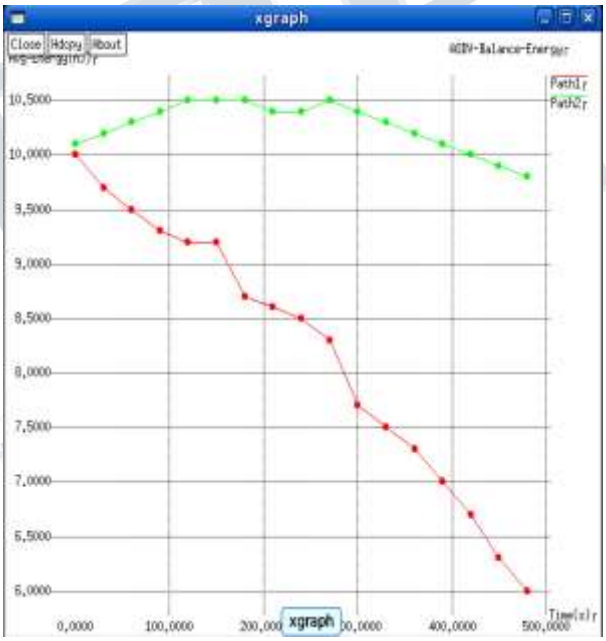

Figure 5:Energy Balancing Performance of AODV in 500s

In this rechargeable battery factor =0.02 and the discount rate r=0.02 then the energy balancing considerations of DMED and AODV is compared and to find the better performance.

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Figure 6:Energy Balancing Performance of DMED in 500s

The energy balancing and maintaining the performance in the DMED is shown in the below figure 5.The following graph shows the overall energy balancing performance in 500s.In the comparison of the two protocols, AODV and DMED ,DMED shows that it is more useful and efficient energy balancing performance and AODV is less energy balancing considerations comparing the DMED.

XII.PACKET DELIVERY RATIO

The packet delivery ratio of the DMED and AODV is to be shown in the following figure.

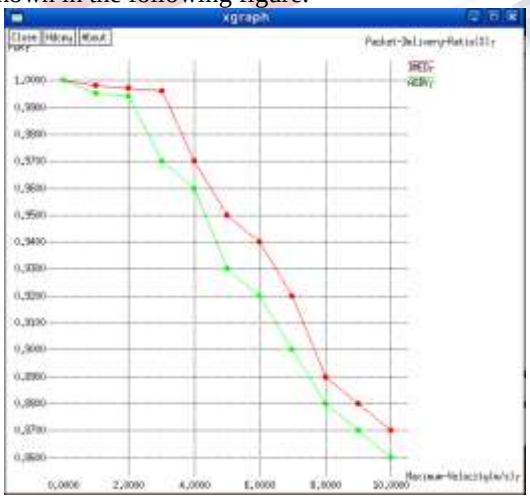

Figure 7:Performance comparison of packet delivery ratio

In the figure the two curves are downwards because of the node movement and need to consume the energy. The greater velocity, the faster energy drop, and then the differentserious packet delivery ratio obtained

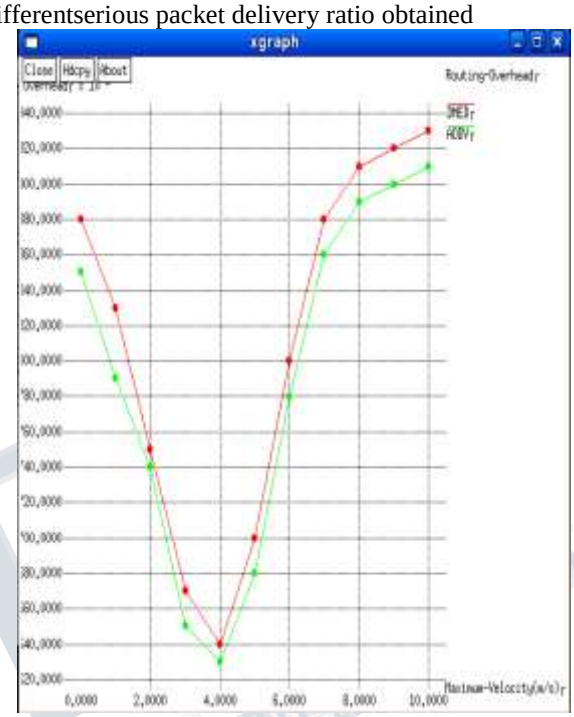

Figure 8: Performance comparison of routing overhead

The Figure 8 shows the overall performance comparision of routing head of the DMED and AODV.The red line indicates the DMED routing protocol overhead and the Green line indicates the routing overhead of the AODV and the different experiments and analysis shown that the DMED routing protocol gives the better performance and the route stability .

XIII . SIMULATION RESULTS AND CONCLUSION

According to the simulation results the Dual mode energy driven routing protocol is most usable and efficient than the adhoc on demand distance vector routing protocol .

DMED is to be used for maintaining and improving the communication and computational quality and energy efficiency and at the same time performs the energy balancing of overall network

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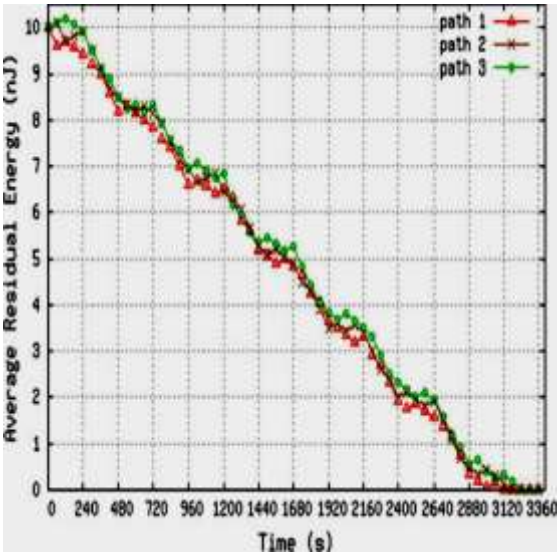

Figure: The energy balancing performance of DMED in 3.360s

This paper is presented for improving the energy efficiency and performing the energy balancing using the dual mode energy driven routing protocol in the wireless sensor network for the planetary exploration.there are mainly two modes are to be used the day mode and the night mode.the day mode is the charging state and the night mode is the sleeping state.

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