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Design of an energy efficient algorithm for sending video data through wireless sensing network

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Abstract **– Video based wireless sensing network continue to gain increasing interest due to their ability to collect visual information for wide range of application. In this work we are designing the energy efficient algorithm. So that maximum energy will remain in the network at the end of communication. Here we compare the normal algorithm which is used for sending low data rates with our energy efficient routing algorithm which is basically used for transmitting the information with high data rates such as video data.**

Index Terms**— Cluster of cluster head algorithm, wireless sensing network.**

I. INTRODUCTION

In recent times, there has been increased interest in video surveillance and monitoring applications. The reasons for this interest are diverse, ranging from security demands and military applications to scientific purposes. In the near future it is expected that video-based wireless sensor networks will make these demands become reality. Video based sensor networks are initially devised as a collection of small, inexpensive, battery operated nodes with the ability to communicate with each other wirelessly over a limited transmission range. What makes these networks different from traditional wireless sensor networks is the fact that the nodes are additionally equipped with very low power cameras. These camera-nodes have the ability to capture images of observed areas at variable rates, to process the data on-board and to transmit the captured data to the user/main processing center.

Usually the video will produce very high data rates. Suppose we use VGA having resolution 320X640, then after applying video compression we get a data rates of 50kbps.Sending the packets with such data rates is a big task for traditional wireless sensing network. If we make attempt to transmit the data with such a rate then the energy remaining in the network will be very less after communication, so for sending data with such high rate needs some advanced algorithm so that energy remain in the network should be maximum at the end of communication, which in turn increases network lifetime.

II. CLUSTER OF CLUSTER HEAD ALGORITHM

In this algorithm we are assuming that there are two cluster heads in the network i.e. nodes with peak energies. So in this algorithm after formation of clusters, the two nodes which are having the maximum energies are found out from each cluster. So before start of simulation of algorithm, the simulator shows the energy present in each node along with the energy of two cluster heads as shown in figure 1.

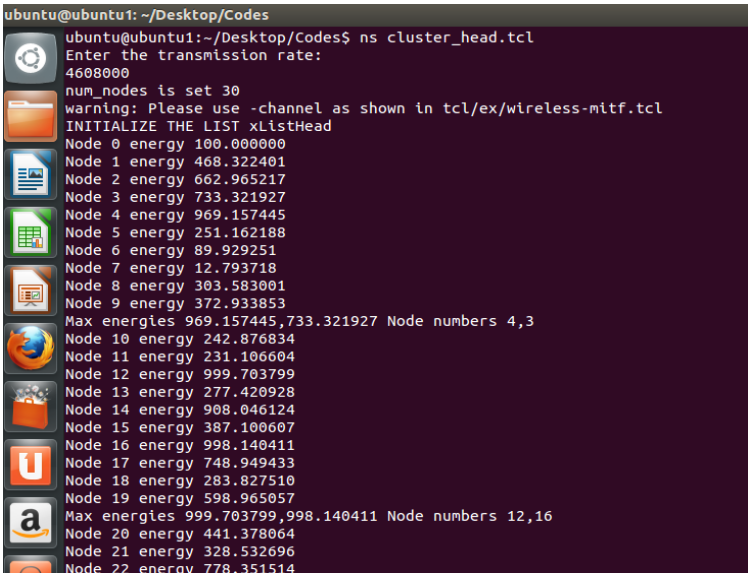

Fig. 1 Energy present in each node in Joules

As shown from the fig. 2 when we want to send data from node 1 to node 29, the algorithm first looking for the two nodes which are having peak energies in given cluster. In above example node 2 and 3 are having maximum energy i.e. 100J and 90J respectively. Similarly at destination side node 25 and 27 are having maximum energy i.e. 95 J and 85J respectively. Now before sending the data the algorithm will

compare the energy of two cluster head and then hop the data through the cluster head which is having maximum energy.

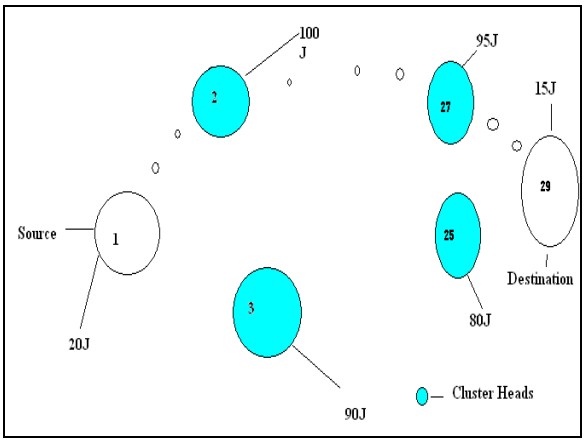

Fig. 2 Cluster of cluster head algorithm

If after some time if energy of current cluster head falls below a certain value which is lesser than the value of energy of another cluster head then hopping of data will be from another cluster. As seen in the above example if energy of node 2 (Cluster head) falls below 90J then node 1 will hop the data via node 3. Same function will be done by cluster heads at the destination side. The switching between the cluster heads and hopping of data through them will be continued till the end of communication.

III. Mathematical Modeling for Cluster of Cluster Head Algorithm

Number of nodes =N
Number of cluster=C

So Number of nodes per cluster = $\frac{N}{C}$ = K.

Let node N_1 , N_2, N_3 ….. N_k be the node in the first cluster
Let E_1, E_2, E_3 ……. E_k be the energies of the nodes in the first cluster

$E_{MAX\,1}$= Max (E_1, E_2, E_3 ……. E_k)
and $E_{MAX\,2}$= Max (E_1, E_2, E_3 ……. E_k) ∩ $E_{MAX\,1}$

Suppose a given cluster contains 10 nodes and node 3 and node 7 are having the maximum energy
Hence $E_{MAX\,1} = E_3$ and $E_{MAX\,2} = E_7$

Therefore node 3 and node 7 are selected as a cluster head.
So if $E_{MAX\,1} > E_{MAX\,2}$

Hence data goes from source node →N3 → Destination cluster head (same algorithm is applied for destination)→ Destination node.

And if $E_{MAX\,1} > E_{MAX\,2}$
then data goes from source node→ N7 → Destination cluster head (same algorithm is applied for destination)→ Destination node.

IV. Comparison of Network With and Without Applying Algorithm

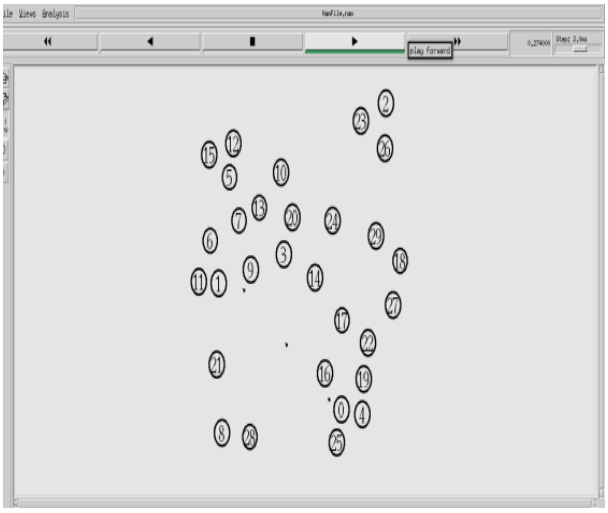

Fig. 3 Simulation without applying algorithm

Figure 3 shows simulation without applying energy efficient algorithm in which communicating nodes directly sends the data towards the destination node with no hopping. Whereas in case of cluster of cluster head algorithm all the nodes are combining in the group of 10 nodes, forming two cluster heads having maximum energy as shown in figure 4.

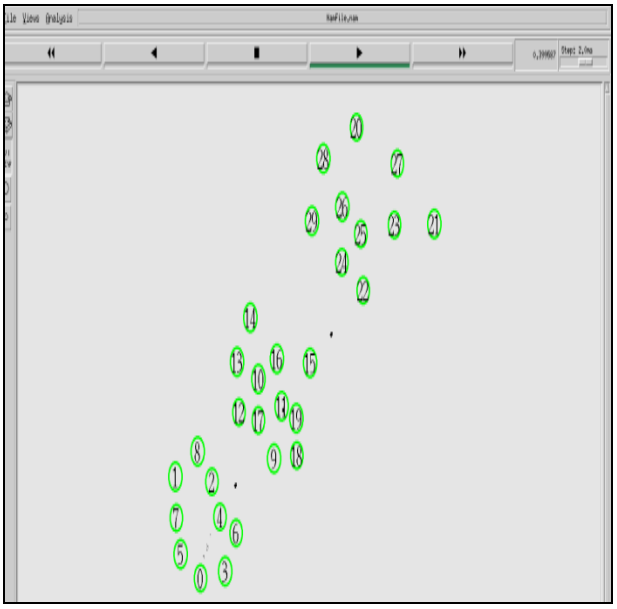

Fig. 4 Cluster of cluster head algorithm simulation

V. OUTPUT

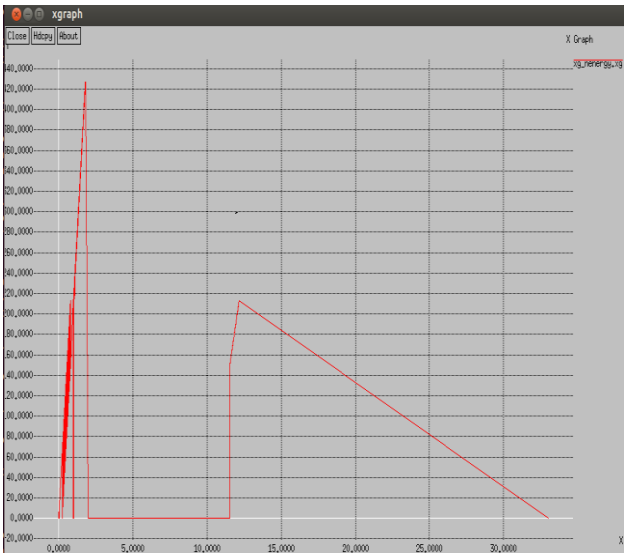

Fig. 5 X-graph for energy Vs time when algorithm is not applied algorithm

Figure 5 show energy remaining in the network after the end of communication when algorithm is not applied to the network i.e. 420J, whereas figure 6 show energy remain in the network after communication for cluster of cluster head algorithm i.e. 995J.

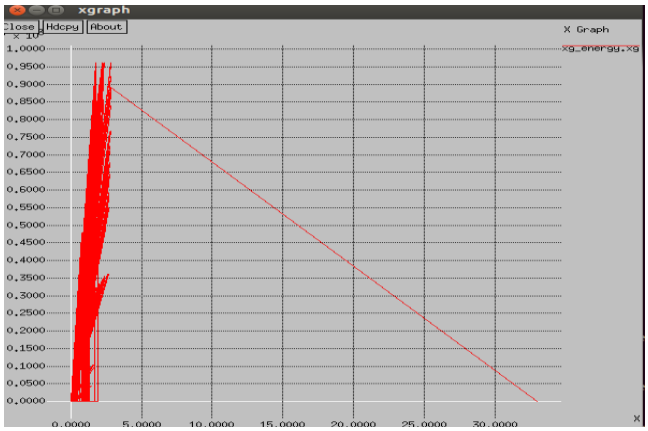

Fig. 6 X-graph for energy Vs time in cluster of cluster head algorithm

VI. CONCLUSION

After using cluster of cluster head algorithm 575J of energy is save there by increasing the network lifetime. So in this way we can say that above algorithm is an energy efficient algorithm for sending video data through wireless sensing network.

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