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Critical Event Monitoring in WSN using Cluster Based CCDS

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Abstract. This paper explores a cluster based sleep scheduling method ton reduce the delay of alarm broadcasting from any sensor in WSNs. When a critical event occurs, an alarm message should be broadcast to the entire network. Specifically, there are two determined traffic paths for the transmission of alarm message, and level-by-level offset based wake up pattern according to the paths, respectively. When a critical event occurs, an alarm message is quickly transmitted along one of the traffic paths to center node, and then it is immediately broadcast by the center node along another path without collision. Therefore, two of the big contributions are that broadcasting delay is only 3D+2L, where D is the maximum hop of nodes to the center node, L is the length of the sleeping duty cycle, and the unit is the size of time slot.

Keywords: sleep scheduling, level-by-level, critical event, cluster.

1. Introduction

Wireless Sensor networks are collections of spatially distributed autonomous nodes that are equipped with sensing, computing, and communication abilities. Motivated by military applications such as battlefield Surveillance, WSNs are becoming increasingly common, and the existing and potential WSN applications span a wide spectrum in various domains, in which environmental and technical requirements may differ significantly. Examples of representative WSN applications are military applications, environmental monitoring, home and office intelligence and medical care. The purpose of deploying a WSN is to collect relevant data for processing and reporting. In particular, base on data reporting, WSNs can be classified as time driven, when sensor nodes of interest continuously overtime, or as event driven, when sensor nodes react immediately to sudden and drastic changes in the value of a sensed attribute due to the occurrence of a certain event [1]. Object tracking, which is also called target tracking, is a major field of research in WSN, and has many real life application such as security applications, and international border monitoring for illegal crossings, it is one of the most energy- consuming applications of WSN. The prediction based tracking technique using sequential pattern (PTSP), which is an object tracking technique that revolves around the ability to predict the objects future movements to track it with the minimum number of sensor nodes while keeping the other sensor nodes in the network in sleep mode [2]. PTSP totally, depends on prediction, it is possible to have some missing objects during the tracking process. Many research efforts have been devoted to sensor scheduling algorithms that turn off redundant sensors for energy savings. Some sensor nodes are put in sleep mode while other sensor nodes are in active node for sensing and communication tasks in order to reduce energy consumption and extend network lifetime, we used randomized scheduling algorithm via both analysis and simulation interms of network coverage intensity, detection delay, and detection probability [3]. Delay/Disruption Tolerant Network (DTN) to enable communications between disconnected network entities [4]. An Energy-Aware Scheduling scheme is a kind of an adaptive on-off scheduling scheme in which sensor nodes use only local information to make scheduling decisions [5].We use a novel sleep scheduling method, to achieve low broad casting delay in a large scale WSN. To eliminate the collision in broadcasting, we use a colored connected dominant set (CCDS) in the WSN. The traffic path from nodes to the center node as Uplink and define the traffic path from the center node to the other nodes as Downlink. Each node needs to wake up properly for both of the two traffics [6].

In this paper we proposed cluster based CCDS to reduce delay of alarms to a center node, when a critical event occur in a one node, that node send a alarm message to main server, the main server immediately send the message to all center nodes in WSN. Based on this technique we reduce time delay, energy consumption, increase networkl life time.

2. LITERATURE REVIEW

Scheduling the sleepduration of each node is one of key elements for controlling critical performance metrics such as energy consumption and latency .we Propose an effective framework for an asynchronous MAC in order to reduce the power consumption of a WSN. We propose two broadcasting algorithms i.e. maximum wakeup interval broadcasting (MWB) and efficient local maximum broadcasting (ELB) [9].

We present a novelsleep-scheduling technique called Virtual backbone scheduling(VBS).VBS is designed For WSNs has redundant sensor nodes.VBS forms multiple overlapped backbones which work [10] alternatively to prolong the network life time. However, virtual backbone scheduling (VBS), a novel algorithm that enables fine-grained sleep-scheduling. VBS Schedules multiple overlapped backbones so that network energy consumption is evenly distributed among all sensor nodes .In this way, the energy of entire sensor node in the network is fully utilized, Which in turn prolong the network lifetime.

An adaptive partitioning scheme of sensor networks for node scheduling and topology control with the aim of reducing energy consumption .In, addition the roles of active nodes and sleeping nodes need to be swapped once in a while to balance the power consumption among all the nodes, which prolongs the network's lifetime. The algorithm that saves energy by utilizing this node scheduling method has been proposed in ad hoc network [11].

The important question providing periodic energy-efficient radio sleep cycles while minimizing the end to-end communication delays. This study aims to minimize the communication latency [12].our simulations suggest that distributed heuristics may perform poorly because of the global nature of the constraints involved. We also show that by carefully choosing multiple wake-up slots for each sensor significant delays savings can be obtained over the single wake –up schedule case while maintaining the same duty cycling.

In many applications critical and common areas must be adequately distinguished; it is more practical and Efficient to monitor critical areas than common areas. The problem of deploying heterogeneous sensor with Minimum cost on grid points to construct a connected .Wireless sensor net workable to fully cover critical square grids, termed critical square grid coverage-h, is introduced and an extension of STBCGCA-his proposed for critical-square grid coverage-h [13].

Putting sensor nodes to sleep is one of the most popular ways to save energy in battery-powered sensor nodes .many existing research studies on sleeping techniques are based on pre knowledge of deployment of sensor nodes [14].we hence propose a distribution-free approach to study energy consumption .In our cost.

we study the cross-layer sleep scheduling design which aims to prolong approach, no assumption of the probability distribution of deployment of sensor nodes is needed.the proposed approach has yielded a good estimation of network energy consumption.

The (Mo) algorithm helps to attain the better tradeoff among energy consumption, lifetime and coverage. the algorithm can be run every time a node failure occurs due to power failure of the node battery so that it may reschedule the network [15].we propose an online density control-based sleep-scheduling method for lifetime- maximization ,energy -minimization, and coverage-maximization ,where coverage is modeled as probabilistic event detection.

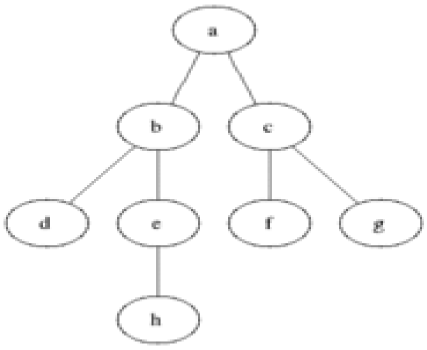
In this paper ,we discuss and analyze the first transmission path's performance of the two-phase geographic forwarding(TPGF)in a CKN based WSN and[16] further propose a geographic routing oriented sleep scheduling(GSS)algorithm to shorten the first transmission path to TPGF in duty-cycled dWSNS.

Clustering and prediction techniques ,which exploit spatial and temporal correlation among the sensor data provide opportunities for reducing the energy consumption of continuous sensor data collection .we propose an energy-efficient framework for clustering-based data collection in wireless sensor networks by integrating adaptively enabling/disabling prediction scheme[17].we propose an algorithm for dynamic updates of clustering and the algorithm requires mostly the local operations and very low communication the network lifetime while satisfying the service availability requirement at the application layer[18]&propose using LP-relax algorithm.

3. EXISTING METHOD

3.1 Breadth First Search:

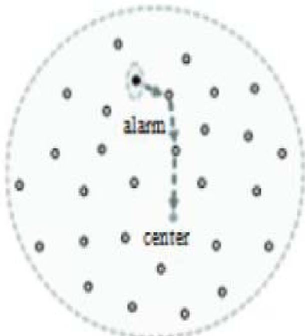
Breadth First Search (BFS) searched breadth-wise in the problem space. Breadth-First search is like traversing a tree where each node is a state which may a be a potential candidate for solution. Breadth first search expands nodes from the root of the tree and then generates one level of the tree at a time until a solution is found. It is very easily implemented by maintaining a queue of nodes. Initially the queue contains just the root. In each iteration, node at the head of the queue is removed and then expanded. The generated child nodes are then added to the tail of the queue.



The main drawback of Breadth first search is its memory requirement. Since each level of the tree must be saved in order to generate the next level, and the amount of memory is proportional to the number of nodes stored, the space complexity of BFS is O (b d). BFS is severely space-bound in practice so will exhaust the memory available on typical computers in a matter of minutes. If the solution is farther away from the root, breath first search will consume lot of time.

3.2 Colored Connected Dominant Set:

A minimum connected dominating set of graph G is a connecting dominating set with the smallest possible cardinality all connected dominating sets of *G*. The connected domination number of *G* is the number of vertices in the minimum connected dominating set.



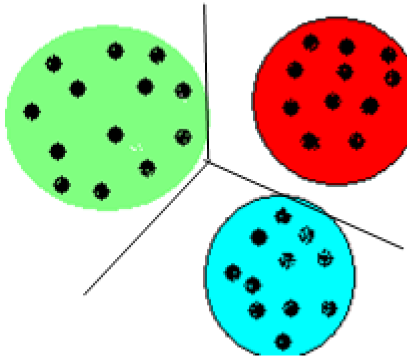
DRAWBACK

1. Physically small and consequently can image only Small region of sky.
2. Typical sizes are 1.0 to 7.5 cm across, much smaller than photographic plates.

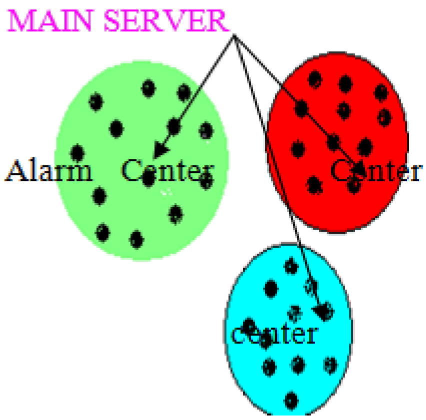
3. There is a practical limit to Size of CCDs because of the time is required.

4. PROPOSED METHOD

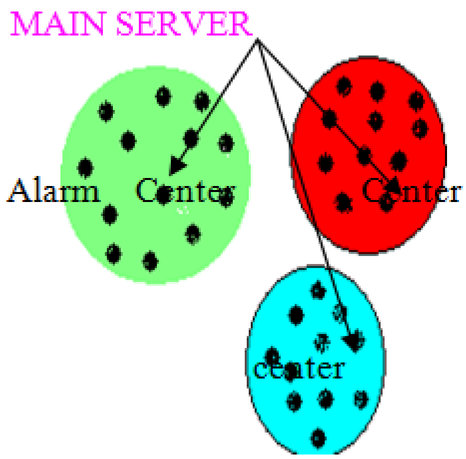
Cluster formation based on distance: A cluster is a set of notes that communicate with each other and work toward a common goal. Generally the distance between two points is taken as common metric to as sess the similarly among the components of a population. Each divided Cluster center node is connected to the main server. If any node gets affected by critical event the alarm message should be broadcast to the main server. The Main Server sends the message at same time to each cluster center node.



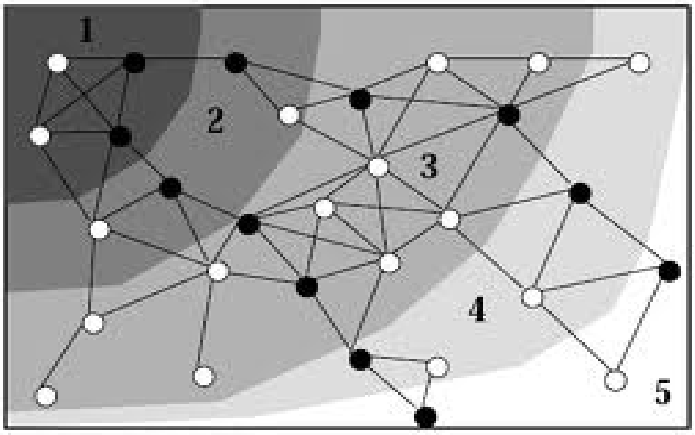
After that the cluster center node broadcast the messages to the neighbouring nodes to wakeup. By doing this we can minimize energy consumption, reduce time duration and prolong network life time.



When a critical event occurs,an alarm is quicklt transmitted along one of the traffic paths to the center node, abd then it is immediately broadcast by the center nodes along another path without collision. The cluster node broadcast the messages to the main server to distribute the center nodes wakeup through power consumption and increase network life time.



To eliminate the collision in broad casting, a colored connected dominant set (CCDS) in the WSNthe traffic path from the center node to other nodes as downlink, To establish the second traffic path, we establish theCCDS in G with three steps: 1) construct a maximum independent set (MIS) in G; 2) select connector nodes to form connected dominated set (CDS), and partition connector node sand independent nodes in each layer into four disjoint sets withIMC algorithm proposed in [12]; 3) color the CDS to be CCDSwith no more than 12 channells



5. Conclusion

This paper proposed cluster based sleeping scheme for critical event monitoring in WSNs. The proposed cluster based sleeping scheme could essentially decrease the delay of alarm broadcasting from any node. The upper bound of the delay is 3 + 2 which is just a linear combination of hops and duty cycle. Moreover, the alarm broadcast delay is independent of the density of nodes in WSN. Theoretical analysis and conducted Simulations showed that the broadcasting delay and the power consumption of the proposed Scheme is much lower than that of existing methods.

6. References

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