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PERFORMANCE ANALYSIS AND EVALUATION OF ENERGY CONSERVATION IN WIRELESS SENSOR NETWORK USING ROUTING PROTOCOL

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Abstract: Wireless sensor networks are a rapidly growing area for research and commercial development. Wireless sensor networks ([1]) are used to monitor a given field of interest for changes in the environment. In a mobile ad hoc network, nodes are often powered by batteries. The power level of a battery is finite and limits the lifetime of a node. Every message sent and every computation performed drains the battery, one solution for power conservation in mobile ad hoc network is power awareness routing. This means that routing decisions made by the routing protocol should be based on the power status of the nodes. Nodes with low batteries ([2]) will be less preferably for forwarding packets than nodes with full batteries, thus increasing the life of the nodes. A routing protocol should try to minimize control traffic, such as periodic update messages to improve the lifetime of the nodes and network. However, not every routing protocol is suitable for implementing power awareness routing and different approaches on power awareness routing.

Keywords: Wireless sensor networks, Energy Efficiency, Routing Protocols

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INTRODUCTION

Now there is new field called mobile computing which gives the basic idea of anytime and anywhere computing. The major reason of mobile computing is advances in wireless technology. But here in this ubiquitous computing environment we can't follow the normal architecture and protocols which have been used in the fixed network due to it's battery powered devices involved in the computing and transmission of the data. The advancement in these miniature computing model and wireless transmission techniques lead to the development of the wireless sensor network. Due to battery limitation and ad-hoc nature of sensor network , energy efficient protocols are required at all the layers of the protocol stack .Since with an objective of gathering information, sensor network is deployed for a given initial battery energy, it is desired that the network continues to function and provide data updates for as long as possible. This is referred to as the maximum lifetime problem in sensor networks. Nodes spend a part of their battery energy on transmitting, receiving and relaying packets during each data gathering phase. Hence the routing algorithm should be designed to maximize the time until the first battery expires, or a fraction of the nodes have their batteries expired, Besides the battery energy in certain low bandwidth network, the channel bandwidth presents itself as another constraint, and the routing problem has to take this into account. There are already several routing protocols developed for mobile ad hoc network what deal with these issues. In a mobile ad hoc network nodes are often powered by batteries. The power level of a battery is finite and limits the lifetime of a node. Every message sent and every computation performed drains the battery . This means that the routing protocol should try to minimize control traffic, such as periodic update messages. To improve the lifetime of the nodes and network even further, one should also try to keep the data traffic as low as possible. This optimization can be achieved by utilizing power awareness routing. This means that routing decisions make by the routing protocol is based on the power-status of the nodes. Nodes with low batteries will be less preferably for forwarding packets than nodes with full batteries thus increasing the life of the nodes. However, not every routing protocol is suitable for implementing power awareness routing and different approaches on power awareness routing can be followed. The main objectives of this paper is to investigate the possibilities for power awareness routing in a mobile ad hoc network.

MATERIALS & METHODS: Power consumption of a node can be divided according to functionality into ; The power utilized for the transmission of a message; The power utilized for the reception of a message; The power utilized while the system is idle. We suggest two complementary levels at which power consumption can be optimized by "control

and management" in wireless communication.

1 OSPFv2 and RIPv2 Routing Protocols under Consideration for Power awareness.

1.1Overview of Open Shortest Path First Version 2:

(OSPFV2) The Open Shortest Path Firstversion2 (OSPFV2) protocol is a link-state Interior Gateway Protocols (IGP) originally designed to compete with RIPV2. It requires each OSPFV2 router to maintain a database of internal topology of the AS domain. From this database, routing table is obtained by performing SPF algorithm (Dijkstra's Algorithm) and by constructing a shortest-path tree. OSPFV2 is designed to provide quick convergence with only a small amount of routing control traffic, even in autonomous systems (ASs) with a large number of routers. As a link state protocol, the core of OSPFV2 consists of creating and maintaining a distributed replicated database (called the link-state database). Each OSPFV2 router originates one or more linkstate advertisements (LSAs) to describe its local part of the routing domain. Taken together, the LSAs form the link-state database, which is used as input to the routing calculations.

1.2 Link-State Algorithm:

OSPFV2 is a link state protocol, which means that routing decisions are made based on the status of the connections (links) between the routers in the network. The link-state algorithm forms the foundation of the OSPFv2 protocol. This algorithm is used by OSPFV2 to build and calculate the shortest path to all known destinations .

1.3 Shortest Path Algorithm:

The shortest path is calculated using the Dijkstra algorithm. The algorithm places each router at the root of a tree and calculates the shortest path along the actual links of the network to each destination.

1.4 Areas and Border Routers:

OSPFV2 uses flooding to exchange Link State Updates between routers. Any change in routing information is flooded to all routers in the network.([9]) To limit the number of Link State Updates and to put a boundary on the explosion of Link State Updates in an OSPFV2 domain a routing hierarchy can be implemented. The routing domain can be divided into regions called OSPFV2 areas. Flooding and calculation of the Dijkstra algorithm on a router is limited to changes within an area. All routers within an area have the exact link-state database. A router that has all of its interfaces within the same area is called an internal router (IR).

2. OSPFV2 Routing Protocol Packets:

The OSPFV2 protocol runs directly over IP and fragmentation is used. OSPFV2 protocol packets have been designed so that large protocol packets can generally be split into several smaller protocol packets.

Study on energy efficient routing in WSN brings this two broad classification of approaches. They are,

·Clustering approach

· Tree based approach

2.1 Clustering approach

Dividing the sensor networks into small manageable units is called as clustering. Though the main reason behind the implementation of the clustering scheme is to improve the scalability of the network, it is an important factor in achieving energy efficient routing of data within the network. Apart from achieving scalability of the network it has more advantages like conserving communication bandwidth within the clusters, avoiding redundant message transfer between the sensor nodes, localizing energy efficient route setup within the clusters. Some of the energy efficient routing protocols based on clustering are LEACH, HEED etc.,

2.1.1 Low Energy Adaptive Clustering Hierarchy (LEACH):

Low Energy adaptive clustering hierarchy (LEACH) is a popular energy efficient adaptive clustering algorithm that forms node clusters based on the received signal strength. The cluster head (CH) aggregates the sensed data from all transmits it to the BS LEACH assumes that the base station is immobile and is located far from the sensors. All nodes are capable of communicating with the BS directly. At any point of time, all the nodes have data to send and nodes located close to each other have co-related data. The cluster head (CH) can perform data aggregation and data dissemination. In LEACH the nodes form local clusters with one of the nodes acting as a local sink or cluster head. If the same node would remain as the cluster head throughout the working of the network, it would die quickly because of the extensive load from the participating sensors in the cluster. Hence the rotation of the cluster head in every round is necessary to distribute the load uniformly.

2.2 Tree Based Approach:

Apart from clustering techniques in WSN, another energy efficient way of routing the data over the network is tree based approach. In this approach a hierarchical manner of aggregation points are formed which resembles the tree structure. The leaves are the source nodes and the root is the sink node. The data when travelling gets aggregated in the intermediate nodes itself.

The most successful energy efficient routing protocol which follows the tree based approach was PEGASIS.

2.2.1 Power Efficient Gathering in Sensor Information System (PEGASIS)

PEGASIS is a near optimal chain based protocol. The basic idea is for the nodes to communicate their sensed data to their neighbors and the randomly chosen nodes will take turns in communicating to the BS. It assumes that the BS is fixed at a far distance from the sensor nodes. The sensor nodes are homogeneous and energy constraint with uniform energy.([4]) The energy cost for transmitting a packet depends on the distance of transmission.

RESULT & DISCUSSION:

One of the main objectives of this paper is to investigate power awareness routing in a wireless IEEE 802.11b ad hoc network .

The key issue with ad-hoc networking is how to send a message from one node to another with no direct link. The nodes in the network are moving around randomly, and it is very difficult that which nodes are

directly linked together and the intermediate node judges its ability to forward the RREQ packets or drop it. The number of packets transferred successfully by each node. Route from source to destination is determined by selecting the most trusted path. Here battery capacity is not considered as an issue for selecting the path between source and destination. Same time topology of the network is constantly changing and it is very difficult for routing process. We efforts to simulate and analyze of these two parameters to discover a reliable power aware route between the source and destination and reduce power consumption.

CONCLUSION:

Routing in sensor networks has attracted a lot of attention in the recent years and introduced unique challenges. In this paper, we presented a comprehensive survey of routing techniques in wireless sensor networks which have been presented in the literature. They have the common objective of trying to extend the lifetime of the sensor network, while not compromising data delivery. The energy efficiency model is untested while the sensor nodes exhibit mobility. Future works may concentrate on achieving better energy efficiency in routing mechanism for mobile wireless sensor nodes.

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