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Design & Implementation of Node Relocalization in Dynamic Reconfiguration System in WSN

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Abstract: In this work, it reviews on the concept of node Relocalization in sensor network using embedded controller. It proposes mobility based dynamic reconfiguration system in WSN. The main objective is to reduce the localization error in the system. By providing access for the user to construct different virtual fields, proposed protocol accomplishes the goal of meeting the need of different applications and different network conditions. In this work, an environmental data collection scenario is taken. In this, all nodes are in dynamic nature and moves randomly. All nodes are communicating with each other as well as from head nodes. There is a direct communication between head & nodes. It provides a multi-hop routing based on shortest path in wireless networks. It provides a complete path with the loss of some packets. In this, it also provides a direct communication between head & nodes without any packet loss. All scenarios will be implemented with the help of MATLAB tool.

Keywords: WSN; routing protocol; dynamic reconfiguration, node Relocalization etc.

I. INTRODUCTION

WSN is a special Ad-hoc network. It doesn't require a fixed network support. As the result, it can be widely used in military, industrial, transportation, environmental protection and other fields. With the development of micro-sensors and low-power wireless communications, the technology of WSN is becoming increasingly mature step by step. Because of the tremendous application potential, it is acknowledged that WSN will play an important role in the next generation networks in the future. In consequence, WSN has already aroused widespread concern. The main function of WSN is to sense the physical world.

In consequence, to collect, process, and forward data, which is sensed by WSN, is a very important task for WSN. Therefore, an efficient routing service is a must for all the applications running on the WSN platform. A lot of routing protocols specially designed for WSN have been proposed. In the early stage, the researchers' focus is mainly on the process of data forwarding. The typical protocols include Gossiping Protocol, Sensor Protocols for information via Negotiation (SPIN), Directed-diffusion Routing, Greedy Perimeter Stateless Routing (GPSR), and Trajectory Based Routing (TBF). These routing protocols are all different from those protocols designed for the traditional. The differences are mainly reflected in two respects: the rules for choosing the next node and the data used for calculating the next node. With the researches of routing protocol for WSN going on, the researchers' focus transfer to guarantee the QoS requirements of the applications running on the WSN. The typical protocols include Energy Aware Routing (EAR), Energy-Balanced Routing Protocol (EBRP), Low-Energy Adaptive Clustering Hierarchy (LEACH), Rumor-routing and others. These protocols, which are listed above, are all designed exquisitely for a specific use. For example, EBRP uses its characteristic rules to make the sensor networks keep working as long as impossible.

Users play a more active role in communications, controlling connectivity and content in cooperative environments. They develop spontaneous wireless networks, called User-centric Networks, simply based on cooperation and access sharing on particular communities. Such user centric environments raise new challenges to the traditional and tightly controlled mobility management schemes, since user devices can operate as network elements. Besides the user-centric networks, a more flattened network architecture for mobile Internet is anticipated to meet the needs of rapidly increasing traffic from the mobile users and to reduce costs in the core network. Service providers are already developing new strategies, such as selective traffic offload through wireless local area networks, in order to deal with traffic that exceeds available capacity. It has been a paradigm shift in user's traffic behavior with the increase of communication between devices in the same geographical area, which may require the migration of mobility servers closer to the end-user.

Wireless mesh network (WMN) has recently emerged as a promising technology to offer services to increasing number of mobile internet users. It has become more appealing technology for network service providers as it is cost effective, robust and easy and fast deployable. A WMN is constituted by three types of node: mesh client (MC), mesh router (MR) and gateway (GW). MCs use the services offered by the network. MRs are basically the wireless routers and performs routing. The WMN is connected to the internet through the GW. The downstream internet packets are received by GW and sent

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to the destination MCs through the WMN. The MC sends upstream internet traffic to the GW through the WMN. The major problem is to ensure seamless internet connectivity to MC having different mobility characteristics.

When the MC moves out of the vicinity of a MR and enters into another, mobility management process becomes necessary for routing of packets to and from the MC. In iMesh and Mesh networks with Mobility management (MEMO) the MC has to send location update message to the GW when it gets associated with a new MR. If the MC is highly mobile, its point of attachment changes very frequently and the cost incurred by location update becomes high. On the other hand, in Mesh Mobility Management (M3) a forward chain is added from old MR to new MR. But, in a scenario where session arrival rate to the MC is high, large number of packets has to traverse through the forward chain.

This results in high packet delivery cost. So, before sending location update message, mobility of the MC and its session arrival rate needs to be considered With the development of wireless sensor network (WSN), the development of the key technology is also become the research focus. As the research of the positioning technology in, which is one of the key technologies of wireless sensor network? Node location technology has become a premise in the research of sensor network identification, monitoring and positioning. Knowing the location information of each node can not only make the perception of data become meaningful but also it can conduct auxiliary work in the operation and management of wireless sensor network.

Wireless sensor networks are highly distributed selforganized systems. A wireless sensor network is made of a large number of scattered tiny low-cost devices featuring strong constraints in terms of energy, processing, communications and memory capabilities. Common applications of WSN deployed on a given space are data collection from sensor node measurements that are transmitted to a specific node called the sink node. Typical deployment of wireless sensor network can be seen Figure 1

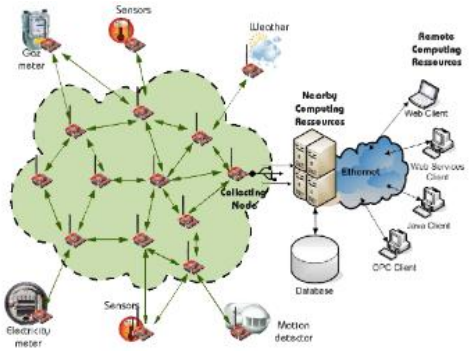

Fig 1: Deployment in Wireless Sensor Networks

In this paper, it studies the concept of dynamic reconfiguration in system with the help of controller. Further, in section II, it represents the related work of system and its various problems. In Section III, It defines the problems related to actual concept and then defines the objectives of proposed technique. Finally, conclusion is explained in Section IV.

II. RELATED WORK

Some Authors [1] proposed routing protocol design is an important problem for the WSN research. In early stage, many routing protocols designed for traditional ad hoc networks, which can provide specific QoS guarantee, have been proposed. How to design a routing protocol, which can meet the need of different applications and different network conditions, is an extremely challenging problem. In this paper, a routing protocol DRRP based on the concept of potential in physics is proposed to solve this problem. This routing protocol designed specially for WSN is with the ability of dynamic reconfiguration. With the help of dynamic reconfiguration, the routing protocol can be changed by the remote administrator according to the need of different applications and different network conditions.

Some Authors [2] proposed Mathematical models for distance estimation, cost function and gradient of cost function that can be used in a distributed localization algorithm are developed. This study also introduces a sensor data fusion approach, combining accelerometer data, RSSI, antenna radiation pattern and node orientation to reduce the computation complexity during the tracking phase. This paper has considered the development of a framework to include a mathematical model of the antenna radiation pattern in a WSN node localization algorithm. The paper has demonstrated a successful implementation of the algorithm using a Gauss-Newton optimization method. The model improves the accuracy of localization by 59%. The model was developed for a 2-D plan

Authors [3] presented we first model the reliability of two different types of sensor nodes: energy harvesting sensor nodes (EHSNs) and battery-powered sensor nodes (BPSNs). We then present wireless link reliability models for each type of sensor nodes, where effects of different parameters such as battery life-time, shadowing, noise. Based on the node and link reliability models, we compared performance of different routing protocols including D, H, R, RH, and WH in terms of the average end-to-end path reliability. A dynamic routing approach that integrates the two best performance routing algorithms R and RH was proposed.

Some [4] proposed researches the part of localization application based on wireless sensor network, focuses on DV-Hop localization algorithm. Improves the algorithm from the defect problems of the original algorithm to get this improved algorithm and the simulation is in comparison with the original algorithm. Improved algorithm maintaining simple, low cost advantage of the original algorithm and improve the positioning precision of the node and under the condition of the same location accuracy required less number of anchor nodes.

Some [5] proposed that first step toward decoupled and distributed mobility management architecture; we propose

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and evaluate different approaches for the distribution of the mobility management functionalities. The results of the evaluation demonstrate that the distribution of mobility management functionalities through elements closer to the end-user improve both user and network performance, even in a hierarchical network topology. The distribution of mobility functions in the network (handover management, location management and data management): fully centralized, partial distributed and fully distributed mobility management approaches. The improvement of data performance, the fully-distributed approach also reduces the search and update times of location management.

Some authors [6] proposed a session-to-mobility ratio (SMR) based mobility management scheme. The scheme enables the MC to send location update message to the gateway, uses forward chain, tunneling and a threshold SMR value for reducing the cost of mobility management. The effect of selection of the threshold SMR on cost per handoff, cost per packet delivery. Mobility of the MC is considered for sending location update message to the GW, highly mobile MC will not send location update message frequently and location update cost will decrease. At the same time session arrival rate is also considered, so the forward chain length gets limited and in case of heavy internet traffic towards the MC packet delivery cost will be limited.

Authors [7] presented a entire working flow for generate, remotely configure and reconfigure the HW in a target custom reconfigurable platform developed at CEI (Centro de Electronic a Industrial) is presented. The custom platform includes a microprocessor and an FPGA (Xilinx partially reconfigurable) to carry out all the processing tasks. The reconfiguration process is base on the JTAG standard; the solution is portable to other FPGAs. Remote reconfiguration provides the possibility of building intelligent nodes, while the FPGA gives higher performance and flexibility.

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Some Author [8] introduced] approach is applied to four test distribution systems to examine its performance. A demonstration system consisting of the test system and distributed intelligent agents is built using MATLAB/Simulink to illustrate how the decentralized approach is implemented. Simulation results of the proposed approach are then compared with results of a centralized implementation and the harmony search method. It is shown that the decentralized approach. The optimal configuration for each operating period to significantly reduce system energy losses. The enhanced performance of the hierarchical decentralized.

Some Author [9] presented an ISO/IEC/IEEE 21451 transducer electronic data sheet (TEDS) architecture for the management of reconfigurable WSNs nodes is proposed. To test the node architecture and validate its capability, the proposed TEDS were implemented for an environmental sensor network. This work proposes a new TEDS template in order standardized the reconfiguration process in WSNs nodes. The implementation of this new TEDS into a reconfigurable adaptive wireless sensor node is presented the use of the new TEDS increases sensor nodes flexibility while its implementation does not affect the network performance in issues related to power consumption and bandwidth requirement.

III. DYNAMIC RECONFIGURATION NETWORK

A wireless sensor network (WSN) is a wireless network consisting of spatially distributed autonomous devices using sensors to cooperatively monitor physical or environmental conditions, such as temperature, sound, vibration, pressure, motion or pollutants, at different locations. Originally developed as a military application for battlefield surveillance wireless sensor network has been an area of active research with many civilian application covering areas such as environment and habitat monitoring, traffic control, vehicle and vessel monitoring, fire detection, object tracking, smart building, home automation, Wireless sensor networks gather data from places where it is difficult for humans to reach and once they are deployed, they work on their own and serve the data for which they are deployed

In real wireless sensor networks, the sensor nodes use battery power supplies and thus have limited energy resources. In addition to the routing, it is important to research the optimization of sensor node replacement, reducing the replacement cost, and reusing the most routing paths when some sensor nodes are non-functional. The Fault recovery algorithm requires replacing fewer sensor nodes and reuses the most routing paths, increasing the WSN lifetime and reducing the replacement cost. Generally, simultaneous node failures are very improbable unless a part of the deployment area becomes subject to a major hazardous event, e.g., hit by a bomb. Considering such a problem with collocated node failure is more complex and challenging in nature. One major challenge in a WSN is to produce low cost and tiny sensor nodes. Prolonging the network lifetime depends on efficient management of sensing node energy resource. Energy consumption is therefore one of the most crucial design issues in WSN.

From the survey, it can be obtained that a routing protocol designed for WSN should have the ability of adapting to different applications and different network conditions. If we can change the routing protocol remotely according to the applications' requirement and the network conditions, we can achieve this goal. Currently, it is very difficult, if not impossible, to change a routing service in a large scale sensor network because the service is statically pre-configured into each node, which is often unattended. So, it proposes a mobility based network reconfiguration system in WSN which can be dynamically reconfigured. Then we present the mechanism of dynamic reconfiguration. The dynamic reconfiguration at node level sought to minimize energy consumption by dynamically adjusting hardware platforms of sensor nodes. The utilization of reconfiguration technique have to consider dynamic factors, such as changes in user requirements, variations in communication channel quality, application changes etc. Due to this, the main

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objective of this thesis is to design mobility based self network reconfiguration system in WSN.

In actual, the actual system presented a routing protocol for WSN, which can be dynamically reconfigured by the remote administrator. It could achieve the goal that adopt to different applications and different network conditions. This protocol would give the administrator of the WSN a powerful ability. With this great ability, the administrator could change the routing protocol remotely to adopt different applications and different network conditions. In order to get this ability though our routing protocol, they supported some commands for the administrator to change the routing protocol running on the sensor network platform. The nodes would change their routing protocol when they received the commands. To let the commands come into play on the nodes, they provided a set of mechanisms. With these commands and mechanisms, this routing protocol was endowed with the great ability of adapting to different applications and different network conditions.

IV. CONCLUSION

This work presents a review on an approach for dynamic reconfiguration in sensor networks. All scenarios of the dynamic reconfiguration infrastructure will be evaluated in detail. In this work, a scenario will present for communicating all nodes with each other. A head will be provided for giving the instructions to all nodes. The need for reconfiguration architecture for sensor network applications is apparent from the results of even a simple environmental monitoring algorithm. This routing protocol designed specially for WSN is with the ability of dynamic reconfiguration. With the help of dynamic reconfiguration, the routing protocol can be changed by the remote administrator according to the need of different applications and different network conditions. The main performance parameter will be localization error. With the help of this, it may prove the better stability of system.

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