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Healthcare system in LACAS technique by Congestion control in WSN

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Abstract - Wireless Sensor Networks are considered to be one of the key research areas in Networking and healthcare units for improving the quality of life. Normally there are wearable and implantable body area networks for continuous monitoring of patients. It is observed from the survey that numbers of elderly people are going to be increased in the next 20 years. Thus, there is a need to provide quality care and service by reducing the healthcare cost.

In existing model to control the congestion, they have used LACAS and PCCP protocol. Even though this model has resulted in providing good Quality of Service and efficient energy, it was not able to overcome the looping problem. Thus this proposed model uses the Destination Sequenced distance vector routing along with the LACAS to overcome the looping problem.

The main process here is that, the information from various nodes in the sensors inside the body is given to the central node. DSDV contains a sequence number and if the link is present it is even else odd numbers are used. If the router receives new information, it uses the latest sequence number and if this number is same as that of the previous number in the table, a router with better metric is used. Thus as the result the looping problem was avoided and the congestion in the nodes are controlled efficiently with good quality of service and energy.

Key Words:- Congestion, Healthcare, LACAS and Sensor Networks

I. INTRODUCTION

Healthcare units are the major challenging area in developed countries due to the cost of hospitalization and specialized institutions.The developing countries also suffer in this area due to the doctor to patient ratios. Recent advancement in wireless communications and electronics have led the development of low-power, low cost, multifunctional small sensor nodes that are terribly tiny in size and have the shorter communication vary. These tiny sensor nodes, that incorporates sensing, computing, communicating the thought of sensor networks.A wireless sensor network describes a major improvement over typical sensor networks. A sensor network is formed of an outsized range of sensor nodes that are densely deployed either within the development or terribly almost it. The position of sensor nodes needn't be designed or planned. This enables random deployment in some applications. A number of the appliance areas are military and health, etc. In wireless sensor networks (WSNs), security and energy consumption are thought about as durable technical challenges as sensors. typically suffer from complexness and energy constraints. In typical WSNs, sensor nodes should report the sensing or monitoring information to a central node, known as the sink, once receiving query messages sent by the sink. As a result of sensor nodes are terribly small and internal battery powered devices, charging the batteries for sensor nodes is usually difficult. Operations, like sensing, communication, and computation and data transmission is that the major source of energy consumption. From military to civilian applications, binary distributed detection issues in wireless sensor networks (WSNs) are enclosed in an exceedingly wide selection of area like military, police investigation, inventory management, and lots of others. Early warning system like intrusion detection and disaster alert, network management within the self-organized network, and spectrum sensing within the cognitive radio are the notable ones that the binary distributed detection is applied to forestall a possible conflict or crisis.

II. LITERATURE SURVEY

2.1 Research challenges in computation, communication and context awareness for ubiquitous healthcare:

The rapid growth of wireless and non-invasive sensor technologies and low-power wireless communication technologies has enabled continuous monitoring of mobile patients using compact biomedical sensor nodes, also called motes. These small wearable devices limited in memory, energy, computation, and communication capabilities are capable of continuously monitoring vital signs such as blood pressure and flow, temperature, electrocardiogram (ECG), electromyogram (EMG), oxygen saturation, and CO_2 concentration. However, there are numerous tasks involved in rendering this data useful. First, significant amount of pre-processing like noise rejection, data disambiguation, and consistency check has to be performed on the raw data provided by the failure-prone inexpensive sensors. Second, there is a need to prioritize the transmission of huge amount of pre-processed vital sign data from multiple body sites on a patient and from multiple patients (say, in a retirement home or hospital setting) in terms of their degree of importance for diagnosis to avoid network traffic congestion and to maximize reliability. Third, the collected vital signs have to be input into compute-intensive models to derive meaningful physiological parameters of interest.

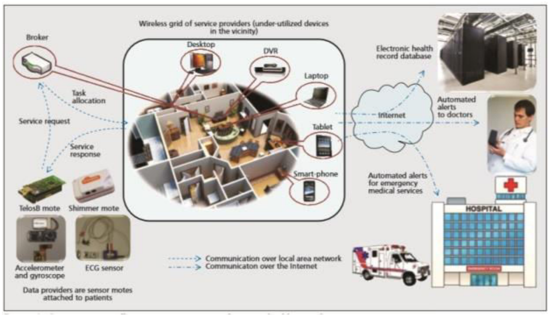

Fig 1: Overview of Healthcare system

2.2 LACAS

The LA based approach is designed in such a manner that the automata stationed in intermediate nodes of network continuously interact with environment,depending on the traffic load at each node and the rate has to be maintained.This rate changes when the traffic congestion level changes.The automata which is stationed at each node learns from the past behaviour and chooses a better data flow rate that is likely to avoid congestion from occurring from the network.This algorithm does not require the source nodes to be fed back by the intermediate nodes to slow down which is done in many congestion control schemes.In this approach this time is saved by making the intermediate node to take proactive approach in controlling the current rate of flow of packets thereby improving the overall performance of the network.This automata is made to act from the start itself and adjust to a data flow rate that minimizes the packet loss and energy consumption at the nodes and increases the packet delivery rate so that the maximum throughput is achieved.This approach avoids the congestion in busy network,so that continuous monitoring and diagnosis of patient can take place without losing the vital patient data.

2.3 Destination sequenced distance vector protocol (DSDV)

DSDV is a modification of Bellmann-Ford routing algorithm. This addresses theDrawbacks related to poor looping properties of routing internet protocol. This feature makes it more suitable for ad-hoc networks. Destination sequenced distance vector routing (DSDV) is adapted from the conventional Routing Information Protocol (RIP) to ad hoc networks routing. It adds a new attribute, sequence number, to each route table entry of the conventional RIP. Using the newly added sequence number, the mobile nodes can distinguish the route information from the new and thus prevent the formation of routing loops. In DSDV, each mobile node of an ad hoc network maintains a routing table, which lists all available destinations, the metric and next hop to each destination and a sequence number generated by the destination node. Using such routing table stored in each mobile node, the packets are transmitted between the nodes of an ad hoc network. Each node of the ad hoc network updates the routing table with advertisement periodically or when significant new information is available to maintain the consistency of the routing table with the dynamically changing topology of the ad hoc network. If a node receives multiple update packets for a same destination during the waiting time period, the routes with more recent sequence numbers are always preferred as the basis for packet forwarding decisions, but the routing information is not necessarily advertised immediately, if only the sequence numbers have been changed. If the update packets have the same sequence number with the same node, the update packet with the smallest metric will be used and the existing route will be discarded or stored as a less preferable route.

III. EXISTING SYSTEM

3.1 LA TECHNIQUES

The theory of LA centers on the notion of an "automation," which is a self-operating machine or a mechanism that responds to a sequence of instructions in a certain way, so as to achieve a certain goal. The automaton either responds to a pre-determined set of rules, or adapts to the environmental dynamics in which it operates. The term"learning"refers to the act of acquiring knowledge and modifying one's behaviour based on the experience gained. With respect to the adaptive automata in this paper, the network adapts to the responses from the environment through various interactions with them.

The environment:

The LA continuously interacts with the environment to process the responses to its various actions. Finally, through sufficient interactions, the LA attempts to learn the optimal option offered by the random environment. The RE offers the set of possible actions to choose from.

Action probability updating:

This work dealt with the Variable Structure Stochastic Automata (VSSA). VSSA are the ones in which the state transition probabilities are not fixed. In such automata, the state transitions or the action probabilities themselves are updated at every time instant using a suitable scheme. The transition probabilities and the output function in the corresponding Markov chain vary with time, and the action probabilities are updated on the basis of the input. VSSA depend on random number generators for their implementation. The action chosen is dependent on the action probability distribution vector, which is, in turn, updated based on the reward/penalty input that the automaton receives from the RE. The action probability updating scheme that has been designed is, essentially, a Linear Reward-Inaction Scheme (LRI) scheme. It is based on the principle that whenever the automaton receives a favorable response (i.e., reward) from the environment, the action probabilities are updated, whereas if the automaton receives an unfavorable response (i.e., penalty) from the environment, the action probabilities are unaltered.

3.2 LACAS algorithm

Algorithm: LACAS

Input:

• G: The network.

• N': The number of nodes in G.

• N: The number of nodes acting as intermediate nodes during any run.

• Set of actions = for an intermediate node.

• Rate corresponding to each of the actions = bits/sec in an automaton, where Output:

• For each automaton, the rate corresponding to the most optimal action, where

Principal Steps:

BEGIN

Step 1: Put the loop for all the intermediate nodes

For every intermediate node, execute Steps 2 to 4 until P [1]

Step 2: Initialize the probability of selecting an action from the set of actions

Initialize the probability of selecting

Step 3: Select an action randomly out of n actions present

Choose an action randomlayout of a set of n actions as follows: =rand ( ) %n+1. Step 4: Updatethe probabilities at every node until an optimal action is chosen at that node *********/

While (1)

{

if action is chosen and the Environment response, update the probabilities according the following scheme: else update the probabilities according to the following scheme:

}

Step 5: Transmit the packets corresponding to the rate selected by the automaton

Transmit data packet with the rate bits/sec corresponding to

END

IV. PROPOSED MODEL

4.1LACAS:

In this paper we use the algorithm called learning automata based congestion avoidance scheme. This involves in finding the shortest path in a network. This algorithm intelligently learns from the past and improves the performance of the network as the time progresses.

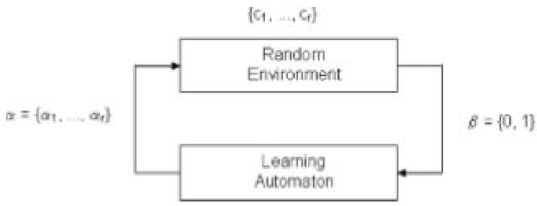

Fig2 Automation Environment Feedback loop

The Automaton, in this case, is, generically defined by {A,B,Q,F(.,.),G(.)}, where:

• A = {α1, α2,…. αr} is the set of outputs or actions, and α (t) is the action chosen by the automaton at any instant t.

• B is the set of inputs to the automaton, {β1, β2,…. βr}. Here, β (t) is the input at any instant t, while the set B can be finite or infinite.

• Q = {q1(t),q2(t),...,qs(t)} is the set of finite states, where q(t) denotes the state of the automaton at any instant t.

• F(.,.):Q×B → Q is a mappinginterms ofthe state and input at the instant t, such that, q(t+1)=F[q(t),β(t)]. It is called a transition function, i.e., a function that deter- mines the state of the automaton at any subsequent time instant (t+1). This mapping can either be deterministic or stochastic, depending on the environment in which the automaton operates.

• G(.,.): is a mapping function G : Q → A, and is called the output function. Depending on the state at a particular instant, this function determines the output of the automaton at the same instant as: α(t)=G[q(t)]. This mapping can, again, be considered to be either deterministic or stochastic, dependingon the environment in which the automaton operates. Without loss of generality, G is deterministic.

4.2 DSDV

DSDV is a modification of the conventional Bellman-Ford routing algorithm. It addresses the drawbacks related to the poor looping properties of RIP. The main drawbacks of existing protocols like link-state and distance-vector protocol are that they take too long to converge and have a high message complexity. Because of the limited bandwidth of wireless links in an ad hoc network, message complexity must be kept low. In addition, the rapidly changing topology requires that the routing protocols can find routes quickly.

So new routing protocols has been developed. The destination sequenced distance vector (DSDV) protocol is an adaptation of the classical Bellman-Ford routing protocols. It is specifically targeted for the ad hoc networks. It addresses the long-lived loops and counting to infinity problems of the conventional distance-vector routing protocols. It adds a new attribute, sequence number, to each route table entry of the conventional RIP. Using the newly added sequence number, the mobile nodes can distinguish stale route information from the new and thus prevent the formation of routing loops. If a node receives multiple update packets for a same destination during the waiting time period, the routes with more recent sequence numbers are always preferred as the basis for packet forwarding decisions, but the routing information is not necessarily advertised immediately, if only the sequence numbers have been changed. If the update packets have the same sequence number with the same node, the update packet with the smallest metric will be used and the existing route will be discarded or stored as a less preferable route.

We in this paper use the LACAS algorithm with DSDV protocol thereby curbing down the congestion, reducing the looping problem, energy consumption and increase the throughput.

V. CONCLUSION

The proposed scheme is capable of effectively avoiding congestion while increasing the throughput and the number of packets delivered to the sink node, while consuming significantly less amount of energy available at the nodes and decreasing the number of collisions at the intermediate nodes. Our approach uses the principle of LA. The advantage of our proposed algorithm, THE MODIFIED LACAS, is that, the automata stationed in the different sensor nodes interact with their environment to select a locally optimal action at every time instant, based on the knowledge of previous levels of congestion, to finally gives an optimal solution, which is capable of reducing congestion significantly. The DSDV protocol which is used here significantly reduces the looping problem thus increasing the throughput. As stated earlier, our results show that THE MODIFIED LACAS is, indeed, capable of curbing down congestion in WSNs. Also, the number of packets that are delivered from one node to other increases significantly.

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