

Effective Health Network Based On Optimized Adhoc On Demand Distance Vector Routing Protocol

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Abstract—In this paper, Evolution of wireless, medical and computer networking technologies have merged into an emerging horizon of science and technology called Wireless Body Area Networks (WBANs). However, applications of WBANs are not limited to medical field only. WBAN is also considered as an important branch of wireless networks due to its appliances. In WBAN and WSN, energy efficiency, mobility and localization of sensor or mobile nodes is an eye-catching issue to achieve better optimization of WSNs. Data transmission between two nodes in MANET's may be requires multiple hops as the nodes transmission range is limited. Mobility of the different nodes makes the situation even more complicated. Ad-hoc network suffer from the lot of issues and congestion and security are the major issues which lead to severe degradation of network throughput and increases the routing overheads. This project presents the MANET with Optimized AODV which the modified version Enhance local repair AODV by improving its Route Error message format. This project is a new scheme to improve AODV protocol by the concept of reliable distance. The Ad Hoc on Demand Distance Vector (AODV) protocol is an on-demand protocol specialized for mobile ad hoc networks due to node mobility and limited transmission range.

Keyword- congestion, degradation, AdHoc-ondemand distance vector(AODV)

I. INTRODUCTION

Basic computer literacy has created the ability to exert tremendous influence on users to provide health services. Administrative procedures performed online, rich Internet portals about health, and access to email and personal physicians have created a new dimension in maintaining health and treating patients [1]. According to Statista, a global statistics portal, the number of Internet users in 2014

exceeded two billion three hundred thousand people, and this number is expected to exceed eight million three hundred thousand in 2018. According to statistics, the number of Iranian users is estimated to be 45 million. In 2014, 80% of Internet users searched for health information; 66% of searches were associated with diseases, 56% were related to treatments, and 44% of them were for physicians. 47% of Google users have searched health-related items in the Internet. Among the customers of electronic health (e-Health) services, 69% are willing to communicate by email, 49% accept communication by IM or web portals, 45% are interested in communicating with text messages, and 40% are willing to communicate with health applications. It seems that these innovations have changed the physician-patient relationship forever [2].

II. OVERVIEW OF E-HEALTH

Throughout the years, it has been proven that biomedical technology has greatly improved diagnosis, treatment and patient monitoring. Therefore the biomedical system has expanded the way of safeguarding human life. These systems are now getting smaller, more robust and comfortable for life of patient. So that these become more efficient for using. The current trend for biomedical system is there use in wireless technology for exchanging information which increases both the freedom of patient and health worker. Thus Wireless Body Area Network (WBAN) becomes an emerging technology which provides a real-time

health monitoring. One of the targeted applications of WBAN is in medical environments where conditions of a large number of patients are continuously being monitored in real-time. Wireless monitoring of physiological signals of a large number of patients is one of the current needs in order to deploy a complete wireless sensor

network in healthcare system. Such an application presents some challenges in both software and hardware designs. Some of them are as follows: reliable communication by eliminating collisions of two sensor signals and interference from other external wireless devices, low-cost, low power consumption, and providing flexibility to the patients. A WBAN-based wireless medical sensor network system when implemented in medical centres has significant advantages over the traditional wired-based patient-data collection schemes by providing better rehabilitation and improved patients quality of life. In addition a WBAN system has the potential to reduce the healthcare cost as well as the workload of medical professions, resulting in higher efficiency. Energy efficiency is an important issue in WBANs because sensor nodes damage human body tissue. More importantly sensor nodes connected to body are battery operated devices, they have limited life time. So, MAC protocols of WBANs needs to be energy efficient and supports medical applications. It allows integration of low power intelligent sensor nodes. They are used to stream biological information from human body and transmit it to a control device called coordinator. This procedure is very helpful while monitoring health of a person and in case of emergency providing proper medication. MAC protocol plays an important role in determining the energy efficiency of a protocol in WBANs. Traditional MAC protocols focus on improving throughput and bandwidth efficiency. However, the most important thing is that they lack in energy conserving mechanisms. By controlling the energy waste sources, maximizes the network lifetime.

III. MAJOR SOURCE OF ENERGY WASTE

MAC is a sub layer of data link layer commonly known as layer two of Open Systems Interconnection (OSI) model. MAC sub layer is responsible for a number of functions including channel access control, scheduling of the transmission, data framing, error handling and energy management. Therefore the MAC layer is probably the most appropriate level to address the energy efficiency issues. Several MAC protocols for WBANs have been introduced to minimize the energy consumption and the main reason for energy waste in wireless networks are:

Packet Collision:

Occurs when more than one packet is transmitted at the same time. The retransmission of the packets that have collided requires additional energy consumption Idle listening:

This occurs when a node listen to an idle channel to receive data.

Over hearing:

Occurs when a node listen to the channel to

receive packets that are destined for other nodes.

Packet Overhead:

Refers to the control packets and the information added to the headers. The number of control packets used to carry out the data communication process also increases the power consumption.

IV. REQUIREMENTS OF MAC PROTOCOL FOR WBAN

Mostly the requirements of a MAC protocol are: energy efficiency, deployment and adaptability to changing the size, latency, the amount of flow, fairness, and network density. We detail below each requirement.

Energy efficiency: With a large number of nodes powered by battery, it is very difficult to change or recharge batteries for these nodes. The deployment and adaptability to changing the size: As the networks may include many nodes, used protocols have to be able to manage change in number of nodes dynamically. These nodes must be programmable. In fact, when new jobs arise their programs must be changed during operation.

Latency: In BANs, the importance of latency depends on the application. In applications, such as monitoring nodes, BAN will be vigilant for long, but largely inactive until something is detected. During this period of vigilance, there is little data flow in the networks. We note that low latency is essential to minimize consumption.

The amount of flow: Refers to the amount of data transferred from a transmitter to a receiver in a given time. Many factors affect this rate, including the effectiveness of collision avoidance, the use of channel, and latency. Like latency, the amount of flow depends on the application. The applications of body sensor networks often require along life that accepts along latency and low throughput.

V. CLASSIFICATION OF MAC PROTOCOL

The medium access control protocols for the sensor networks can be classified broadly into following

A. Scheduling based Mac protocols

In scheduling-based MAC protocols, the time at which a node can transmit is determined by a scheduling algorithm, So that multiple nodes can transmit simultaneously without interference on the wireless channel. The time is usually divided into slots, and slots are further organized into frames. Within each frame, a node is assigned at least one slot to transmit. A scheduling algorithm usually finds the shortest possible frame so as to achieve high spatial reuse and low packet latency. TDMA allows several users to share the same frequency channel by

dividing the signal into different time-slots. It has a natural advantage of collision free medium access. It supports low duty cycle operation: a node only needs to turn on its radio during the slot that it is assigned to transmit or receive. The limits with TDMA systems are synchronization of the nodes and adaptation to topology changes. The slot assignments, therefore, should be done with regard to such possibilities. However, it is not easy to change the slot assignment within a decentralized environment for traditional TDMA, since all nodes must agree on the slot assignments.

B. Contention based Mac protocols

The contention based protocols based on relax time synchronization and it is used when nodes are not assigned fixed time slot for sending request, and it is very useful when delivery of data is random rather than periodic. Contention schemes differ in principle from scheduled schemes since a transmitting user is not guaranteed to be successful. Contention based protocol usually carrier sense medium access /collision avoidance (CSMA/CA) are easy to deploy and have been the most used ones in wireless sensor network due to their simplicity and flexibility and robustness. Nodes do not need synchronization information or global topology information in order to access the medium access and send their information. And also node can get in get out of the network without major complications. Contention protocol has several advantages compared to schedule protocols. First because contention protocols allocate resources on demand, they can scan more easily across changes in node density or traffic load. Second, contention protocols can be more flexible as topologies change. There is no requirement to form communication clusters, and peer-to-peer communication is directly supported. Finally, contention protocols do not require fine-grained time synchronization as in TDMA protocols. The major disadvantage of a contention protocol is its inefficient usage of energy etc.

C. Collision free Mac protocols

There are some collision free MAC protocols developed by wireless sensor networks. An energy efficient collision-free channel access protocol for WSN reduces energy consumption by ensuring that unicast, multicast, and broadcast transmissions have no collisions, and by allowing nodes to switch to a low- power, idle state whenever they are not transmitting or receiving. E.g.: TRAMA assumes that time is slotted and uses a distributed election scheme based on intonation about the traffic at each node to

determine which node can transmit at a particular time slot. TRAMA avoids the assignment of time slots to nodes with no traffic to send, and also allows nodes to determine when they can become idle and not listen to the channel using traffic information. In that no idle node is an intended receiver and no receiver suffers collisions.

D. Hybrid Mac protocols

Hybrid protocol is a grouping of contention based and Schedule based protocol. Several MAC protocols have been proposed to combine the features of CSMA and TDMA protocols with the aim to include the Benefits from both of them. In these hybrid protocols, Active/sleep duty cycles are applied by dividing time into frames during which a node spends a portion of the time for communication and sleep for the rest time to reduce the energy - wastage caused by idle listening. Recently several medium access control protocols for the wireless sensor network have been proposed by the researchers using different approaches. We have studied the basic categories of MAC protocol; Contention Based, Collision Free, Scheduling Based and Hybrid in terms of reliability, latency, QoS and energy efficiency. Although several designs may have good energy efficiency and delay performance, for real time service support, there are still many challenges. The Hybrid MAC protocols show better and efficient features for real time applications but there are still many more challenges that need to be solved in the sensor networks there is still need to find out the suitable solution for real time communication and energy efficiency etc.

VI. SYSTEM STUDY

Feasibility Study

- Feasibility study is a test of proposal to its workability, impact, and ability to meet the user needs and effective use of resources.
- It is both necessary and prudent to evaluate the feasibility of a project at the earliest possible time. Feasibility and risk analysis are related in many ways. If project risk is great, then feasibility of producing quality software is reduced. Feasibility study focuses mainly on the following question.
- Is there a better way of performing users work rather than the current method?
- what is the cost involved in going for a new system?
- what are the benefits the user could gain over the current system?
- what is recommended?

Feasibility consideration

- The proposed system has been analyzed and found to be feasible for development and implementation. There are three types of feasibility study such as
- Technical Feasibility
- Behavioral Feasibility
- Economic Feasibility

Technical Feasibility

- Technical feasibility centers in probing in existing computer system i.e., the hardware and software. This involves financial consideration to accommodate technical enhancement.
- VB.NET and SQL server are already installed under windows platforms. It was found that the work could be done with the current equipment, existing software technology and with the available personnel.
- with the existing hardware and software technology, reliability access rights and data security is guaranteed. Hence the system was found to be technically feasible.

Behavioral Feasibility

Behavioral Feasibility aims at estimating whether the user is able to cope with the new system. The project has got sufficient support from management and from the users. This system was found to be operationally feasible.

Economic Feasibility

This procedure involves the analysis of cost involved to set up the new system. The cost involved is compared with the benefits that the new system would render. Since VB.NET and SQL-Server are already in use at the organization, no costs were to be incurred towards the purchase of software.

The cost of conducting the investigation and development of the system were not high and were affordable. The system reduces the cost, effort and time of projects that has been carried out in the organization. The system was found to be economically feasible.

VII. SYSTEM DESIGN ARCHITECTURAL DESIGN

The primary objective of architectural design is to develop a modular program structure and represent the control relationship between modules. In addition, architectural design melds program structure and data structure, defining interfaces that enable data to flow throughout the program.

- Data flow oriented design is an architectural design method that allow a convenient

transaction form

- the analysis model to a design description of program structure. The transaction from information flow to structure is accomplished as a part of a five-step process.
- The type of information flow is established .
- Flow boundaries are indicated.
- The dataflow diagram (DFD) is mapped into program structure.
- Control hierarchy is defined by factoring and
- The result structure is refined using design measures.
- I/O DESIGN
- The procedural design transforms structural components into a procedural description of the software. Source code is generated and testing is conducted to integrate and validate the software.
- The design of the input and output screen comes under the procedural design.

Input/output design is according to the needs of the user. The input and output design are related with each other in the sense that the accuracy of the output data depends on the accuracy of the input data processing of the input data.

Thus for this proposed system the input and output design are in the forms. In the form based interface design, the user input filling the blanks of the screen. in the form design ,all the necessary information of each filed are stated and dedicated so that the user easily input the data without any difficulty. The forms are also designed in such a way the blanks which are to be filled up are made in a sequential pattern. it also helps the user while entering the data.

Input Design

In this project the end user gives the input through the predefined options. For the administrator the input is even C#.net to the database.

In accurate input data is the most common cause of errors in the data processing. Input design is the process of converting user oriented input into a computer based format. The goal of designing is to make data entry as easy, logical and from errors as possible the input forms are designed to be user friendly. meaningful labels are given in to input fields. Immediate validation are done each input from the user so that the individual are not sending to the gateway.

The input forms are designed so that they provided proper links to the other forms. Each screen has the provision to view the home, previous and the next page.

The Administrator can create a new user, edit the existing user, delete the existing user and

view all the user information. But the normal user can only view the user information and edit his /her profile such as Fname, Lname and password and so on.,

Output Design

Computer Output is the Most important and the direct use of information for the user. Output Design very much depended on the type of output and the nature of data and editing and totaling of data. The primary objective of the output is to arrange the data in a form most convenient to the user.

outputs from the Computer system are primarily to communicate the result of the processing to user. they are also used to provide the permanent copy of results for later consultations. Once the output medium has been detailed specification of output document can be carried out.

Interface Design

once an Operational User interface prototype has been created, it must be evaluated to determine wheatear it meets the needs of the user. The Evaluation can span formality spectrum that ranges from a informal test drives, in which a user provides input as feedback formally designed study that uses statistical methods for the evolution of questionnaires completed by a population of end user.

VIII. SYSTEM ANALYSIS

A. EXISTING SYSTEM

Traditional networks in WBAN are commonly facing spectral bandwidth shortage because it has already been crowded with a large number of subscribed users. Thus, very limited cellular network capacity can be allocated to e-health applications, which may result in severe traffic congestion, especially when there will be large deployments of WBANs in a short future. Moreover, since medical data have relatively low rates, maximizing throughput as required by most of the conventional wireless networks is not a design objective for beyond-WBAN communications any more. Instead, these data have to be reported to the medical center in a timelier manner.

Disadvantages:

Different from data packets in general communication networks, medical packets are differentiated by not only their priorities, but also their timeliness. All gateways should be forced to behave truthfully .

The revenue of the network controller should be maximized in order to stimulate the wide

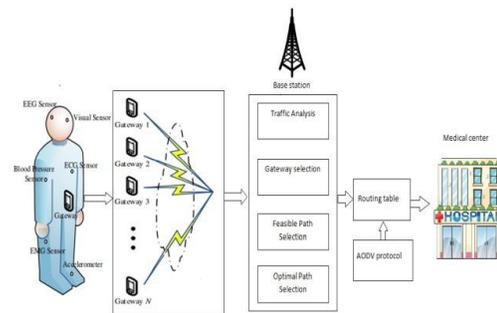
implementation of e-health services.

B. PROBLEM DESCRIPTION

Though the WBAN-based wireless technology can offer a lot of benefits over conventional medical systems in both treatment and prevention of diseases, designing e-health systems is challenged by many emerging issues, which motivate a lot of research efforts in recent years. However, most of existing works limited their emphases on the intra-WBAN communications (the data transmissions from biosensors to the gateway). While, the potential technical problems related to beyond-WBAN communications (the information exchanges between gateways and the remote medical centers) are rarely mentioned. In the cellular gateways, the conventional methods of routing are usually used to communicate beyond WBAN to the medical centers.

IX. SYSTEM DESIGN

A. SYSTEM ARCHITECTURE



B. PROPOSED SYSTEM

This scheme introduces an additional delay control in incapacitated systems to differentiate the transmission services with timeliness so as to ensure that all gateways can behave truthfully. The wireless networks may contain with the heterogeneous devices such as body sensors and the gateway devices. Thus the gateway devices work for the transmission of medical data packets to the medical centre. Here the proposed system is used to improve AODV protocol by the concept of reliable distance. The Ad Hoc on Demand Distance Vector (AODV) protocol is an on-demand protocol specialized for mobile ad hoc network due to node mobility and limited transmission range in beyond WBANs.

Advantages of proposed system:

The beyond-WBAN transmission management is formulated as a multi-class multi-server queuing system with absolutely prioritized scheduling. Increase the possibilities of data

transmission and reduces the packet loss in large networks

FINAL REMARKS

X. CONCLUSION

The increasing importance of e-Health services in expanding public health, saving time and costs, and improving prevention and treatment processes calls for the provision of an appropriate educational infrastructure to increase the efficiency of such services. Among the opportunities and suitable environment for education, working with computers and using the Internet should be provided for people. Custodians of the public health sector should reduce the adverse impacts of directional, false, or outdated information in the Internet by introducing reputable websites. Additionally, due to the impact of e-health services on its users, e.g., comfort, control, and the selection of health, it is recommended that a good investment be made on social networks with monitoring of groups in the health profession and support given to engineering groups.

XI. FUTURE ENHANCEMENT

As part of our future work, we plan to design a routing protocol for inter-WBANs communications within a BBN, considering the aforementioned proposals which should be tailored to fit BBN specific requirements. Indeed, effective incentives are intended to improve the accuracy of BBN deployment and coexistence within the existing infrastructures, in order to ensure public safety and improve the Quality of Life for future human generations.

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