A SURVEY ON IMPROVING NETWORK PERFORMANCE IN WIRELESS SENSOR NETWORKS

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***Abstract*-A wireless sensor network (WSN) is a various networks consisting of a large number of tiny low-cost nodes and additional base stations. Each sensor node comprises sensing, processing, transmission, mobilize, position finding system and power units. Many applications in wireless sensor networks require communication performance that is both consistent and high quality. Unfortunately, performance of present network protocols can become important because of various interferences and environmental changes. present routing protocols estimates link quality based on the reception of control packets over a short time period. This method is neither efficient nor accurate enough to capture the dramatic variations of link quality. The purpose of the survey is to improve consistent network performance in wireless sensor networks such as more stable and the better transient performance. To improve the network performance in wireless sensor network by using a link metric that characterizes link over a longer period of time. Link metric combine with present short term estimations in routing algorithm designs. To further improve network performance a distributed route maintenance framework was designed based on feedback control solutions.**

Index Terms: Wireless sensor networks, routing, lifetime, performance, mobility.

I. INTRODUCTION

Computer Networks is that the main domain. Mainly focusing on improving network performance in wireless sensor networks

Network: Network is a communication between completely different nodes through links.

Computer Networks: Computer network is a telecommunication network that permits computer to exchange data. In computer networks, network computing devices exceed data to each other along network links (data links). Computer networks differ in the transmission media want to carry their signals, the communication protocols to arrange network traffic, the network's size, topology and organizational aim. In most cases, communications protocols are The connections between nodes are established using either cable media or wireless media. The simplest notable computer network is the internet. Network computer devices that originate, route and come to an end the information are called network nodes. Nodes will include hosts like personal computers, phones, servers furthermore networking hardware. Two such devices will be said to be networked along once one device is able to exchange information with the other device, whether or not they have direct connection to each other. layered on (i.e., work using) other more specific or a lot of general communication protocols

Wired Network: Wired networks are also known as Ethernet networks, are the most common type of local area network (LAN) technology. A wired network is simply a collection of additional computers, printers, and other devices linked by Ethernet cables. Wired networks provide users with better security and the ability to move lots of data very quickly. Wired networks are typically faster than wireless networks, and they can be very inexpensive. However, the price of Ethernet cable can add up the additional computers on your network and the farther than distant they are, the more expensive your network will be.

Wireless Network: A wireless network which uses high frequency radio signals rather than wires to communicate between nodes, is another option for

home or business networking. Wireless allows for devices to be shared without networking cable which increases mobility but decreases range. The easiest, least expensive way to connect the computers in your home is to use a wireless network, which uses radio signals instead of wires. The absence of physical wires makes this kind of network very flexible. For sample, you can move a laptop from room to room without fiddling with network cables and without losing your connection. The disadvantage is that wireless connections are generally slower than Ethernet connections and they are less secure unless you take measures to secure your network.

If you want to build a wireless network, you'll need a wireless router**.** Signals from a wireless router expand about hundred feet (30.5 meters) in all directions, but walls can interrupt the signal. Depending on the size and shape of your house and the range of the router, you may need to purchase a variety extender **or** repeater to get enough coverage. You'll also need a wireless adapter in each computer you plan to attach to the network. You can add printers and other devices to the network as well. Some new models have built-in wireless statement capabilities, and you can use a wireless Ethernet bridge to add wireless capabilities to devices that don't. A few devices that use the Bluetooth standard can also attach easily to each other within a range of about 10 meters (32 feet), and a large amount of computers, printers, cell phones, home entertainment systems and other gadgets come installed with the technology.

Cellular Network: A cellular network or portable network is a wireless network distributed over land areas called cells, each served by in any case one fixed- location transceiver known as a cell site or mobile station. In a cellular network, each cell uses a unusual set of frequencies from adjacent cells, to avoid interference and provide guaranteed bandwidth within each cell. When connected together these cells provide radio coverage over a wide geographic area. This enables a large number of convenient transceivers(e.g., mobile phones, pagers, etc.) to communicate with each other and with fixed transceivers and telephones wherever in the network, via base stations, even if some of the transceivers are moving through additional cells during transmission.

Ad hoc Network: A wireless Ad hoc network (WANET) also known as IBSS- Independent Basics Service Set, is a computer network in which the communication links are wireless.

The network is ad hoc because each node is able to forward data for other nodes, and so the determination of which nodes forward data is made energetically based on the network connectivity. Nominal configuration and quick deployment make ad hoc networks suitable for emergencies like natural disasters or military conflicts.

Applications:

- Mobile ad hoc networks
- Vehicular Ad hoc Networks
- Smart Phone Ad hoc Networks

Wireless Mesh Networks (WMN): WMN is a mesh network created through the connection of wireless access points installed at each and every network user locale. Each network user is also a provider, sharing data to the next node. The networking communication is decentralized and simplified because each node need only transmit as far as the next node. WM networking could allow people living in remote areas and small business operating in rural neighborhoods to connect their networks together for reasonable internet connections.

Wireless Sensor Networks (WSN): A wireless sensor network (WSN) is a various networks consisting of a large number of tiny low-price nodes and additional base stations. Each sensor node comprises sensing, processing, transmission, mobilize position-finding system and power units. Many applications in wireless sensor networks needs communication performance that is both consistent and high quality. With the application and architecture requirements. To minimize energy consumption.

II. LITERATURE REVIEW

2.1. The Routing Protocols for protocol operation:

Negotiation based routing: These protocols use advanced data descriptors called meta-data in order to reduce redundant data transmission through discussions. The essential decisions are based on accessible resources and local connections. Sensor Protocols for Information using Negotiation (SPIN) is one of recognized Negotiation based routing protocol for WSN. The SPIN protocols are considered to disseminate the data of one sensor to various sensors assume these sensors are potential mobile-stations. Hence, the main aim of negotiation based routing in WSN is to repress copy information and avoid

redundant information from being sent to the next sensor or the mobile-station by conducting a series of negotiation messages before the original data transmission begins.

Multipath based routing: These protocols propose fault tolerance by having at least one alternate route (from source to sink) and thus, increasing energy consumption and traffic generation. These routes are kept alive by sending periodic messages. Maximum Lifespan Routing in Wireless Sensor Networks is a protocol that routes data through a route whose nodes have the biggest remaining energy. The path is switched whenever a better path is discovered.

Hierarchical Power-aware Routing in Sensor Networks protocol enhances their liability of WSN by using multipath routing. It is helpful for delivering data in unreliable environments

Query based routing: In the protocols, the destination nodes propagate a query for data (sensing task or interest) from the node during the network.

Rumor routing protocol is one of the routing protocol used in the context to event notification. The approach does not flood the network with information about an event occurrence but only installs a small number of paths in the network by distribution of one or some agents. The agents propagate during the network installing routing information about the event in every node that is visited. Once the agents come across shorter paths or more accurate paths, they reduce the paths in the routing tables accordingly. Each node can also make an agent in a probabilistic fashion.

Location based routing: In these protocols, the nodes are addressed by their location. Distances to next neighboring nodes will be estimated by signal strengths or by GPS receivers. Location based routing protocols are tiny Minimum Energy Communication Network (SMECN) protocol sets up and maintains a minimum energy network for wireless networks by utilizing low power GPS. While, the protocol assumes a mobile network, it is finest applicable to sensor networks, which are not movable.

2.2. Routing protocols for Network Structure:

Flat based routing: In these protocols, all nodes have been assigned equivalent roles in the network. The eminent protocols considered in flat based routing are: Sequential Assignment Routing, Directed Diffusion, Energy Aware Routing etc. Sequential Assignment Routing proposed was one of the first protocols for WSN that measured QoS issues for routing decisions. The objective of SAR algorithm is to reduce the average weighted QoS metric throughout the life span of the network. SAR makes a routing decision based on three factors: energy resources, QoS considered for each path, and the packet ‘s traffic type. To resolve reliability problems, SAR uses two systems consist of a multipath approach and localized path restoration done by communicating with neighbouring nodes.

Hierarchical based routing: It is also known as cluster-based routing. In these protocols, the nodes can play various roles in the network and usually the protocol includes the creation of clusters. Additionally, designations of responsibilities for the sensor nodes with different characteristics are also performed. Low Energy Adaptive Clustering Hierarchy is one of the eminent clustering algorithms with distributed cluster formation for WSNs. The algorithm randomly selects cluster heads and rotates the role to distribute the consumption of energy. LEACH uses TDMA/CDMA MAC to minimize inter-cluster and intra-cluster collisions and information collection is centralized with defined periods. It creates clusters based on the received signal strength and uses the Cluster head nodes as routers to the mobile-station.

Adaptive based routing: In these protocols, the system parameters are controlled to be adapted to the actual network conditions by means of acquired information of the network and negotiation between nodes (e.g. the available energy on the node or QoS of the path).

Adaptive based routing is based on the family of protocols called Sensor Protocols for Information via Negotiation, which is explained in Negotiation, based routing. The SPIN protocols are designed based on two basic facts:

1. Sensor nodes operate more accurate and conserve energy by sending metadata instead of sending total data.
2. Flooding method wastes energy and bandwidth when sending extra and redundant copies of data by sensors covering overlapping areas.

In WSN’s current network protocols estimate link quality based on recent probe packets over short time period, the ETX metric. These solutions can achieve high reliability as long as the estimations accurately reflect the link quality when a packet is really transmitted.

The network layer maintenance uses a feedback loop along an active path to translate a given End to End performance specification into per-link requirements to minimize total transmission. Energy consumption beside the path. This loop also distributes these requirements to link layer control modules at each node.

Adam Dunkels[1] suggested as sensor networks move towards increasing heterogeneity. Communication protocols such as link and MAC layer protocols and TCP/IP. The Chameleon, communication architecture for sensor networks. The Chameleon architecture consists of two parts: The Rime communication stack and a set of packet changing modules. The Chameleon architecture is designed to be able to adapt to a variety of dissimilar underlying protocols and mechanisms while being expressive enough to accommodate typical sensor network protocols.

Chameleon takes a drastically different approach to the problem of finding a common packet header format: Chameleon method does not classify any packet headers at all. Rather, Chameleon uses packet attributes**.** To evaluate the flexibility of Chameleon by implementing a set of underlying protocols with Chameleon. He quantitatively evaluates the complexity of the protocol implementations, the memory footprint of our implementation of the Rime stack, and the run-time overhead of our implementation of the architecture. Thus adaptive communication architecture such as Chameleon can be efficiently used for wireless sensor networks.

Y. Gu[2] suggested as in extremely low duty-cycle sensor networks, end-to-end communications cannot give to maintain an always-awake communication backbone. Low duty-cycle, accompanied by the undependable nature of wireless communication, makes it necessary to design a new data forwarding scheme for such networks, so as to achieve network energy efficiency, reliability, and timeliness in an integrated fashion. In this work, we bring in the concept of energetic switch based forwarding (DSF) that optimizes the (i) expected data delivery ratio, (ii) expected communication delay, or (iii) expected energy consumption.

M. Kim[3] suggested as mobile systems must adapt their behaviour to changing network conditions. To do this, they must accurately estimate available network capacity. Producing importance estimates is challenging because network observations are noisy, particularly in mobile, ad hoc networks. Present systems depend on simple, exponentially weighted moving average (EWMA) filters. These filters are either able to notice true changes quickly or to mask observed noise and transients, but cannot do both. Four filters designed to react rapidly to constant changes while tolerating transient noise. Such filters are *agile* when possible, but *stable* when essential, adapting their behaviour to existing conditions. These filters are evaluated in a variety of networking situations, including constant and temporary change, congestion, and topology changes. Find that one filter, based on techniques from *statistical process control*, provides performance superior to the other three. Compared to two EWMA filters, one agile and the other stable, it is able to offer the agility of the former in four of five scenarios and the constancy of the latter in three of four scenarios.

III. MOTIVATION

Motivated by the importance of communication performance that is both consistent and link quality in wireless sensor networks and to overcome No long term link quality, E2E transmission delay, No stability and no transient performance, More packet loss and energy consumption.,If retransmission is required during daytime, then increases sustainability, which consumes more energy.

IV. OPEN PROBLEMS

Quality of service: QOS is the overall performance of a telephony or computer network, particularly the performance seen by the users of the network. It is used to measure error rates, bit rate, throughput, E2E transmission delay, availability. In some applications, data should be delivered within a certain period of time from the moment it is sensed; otherwise the data will be useless.

Mobility: Network topology is highly dynamic due to movement of nodes. Hence, an ongoing gathering suffers regular path breaks. Disruption occurs due to the movement of either intermediate node in the path or end nodes. Mobility support can be very helpful, to maintain and repair network connectivity (self-configuration), to improve network coverage, to balance energy consumption (e.g. rotating cluster-heads/routers), to adapt to dynamic extending WSN lifetime, increase QoS.

Fault Tolerance: Some sensor nodes may fail or be blocked due to lack of power, physical damage, or

environmental interference. The failure of sensor nodes should not affect the overall task of the sensor network. If a lot of nodes fail, MAC and routing protocols must accommodate formation of new links and routes to the data collection base stations. This might require dynamically adjusting transmit powers and signaling rates on the existing links to minimize energy consumption, or rerouting packets through regions of the network where more energy is available. Therefore, multiple levels of redundancy may be needed in a fault-tolerant sensor network.

Node/Link Heterogeneity: several applications of sensor networks might require a diverse mixture of sensor nodes with different types and capabilities to be placed. Data from different sensors, can be generated at different rates, network can follow different data reporting models and will be subjected to different quality of service constraints. Such a various environment makes routing more complex.

Energy consumption without losing accuracy: sensor nodes can use up their limited supply of energy performing computations and transmitting information in a wireless environment. As such, energy conserving forms of communication and computation are essential. Sensor node lifetime shows a strong dependence on the battery lifetime. In a multihop WSN, every node plays a double task as data sender and data router. The malfunctioning of some sensor nodes due to power failure can cause considerable topological changes and might require rerouting of packets and reorganization of the network.

Reliability: WSN equipment must be robust and reliable to overcome all these harsh conditions, to reduce or eliminate maintenance actions, to have a lifetime of years. Robustness (hardware/software) refers to a component or a system that performs well not only under ordinary conditions but also under abnormal conditions that stress. Reliability is the capability of a module or system to perform its necessary functions under stated conditions for a specified period of time. Requires the use of robust hardware/software and requires the support for fault-tolerance mechanisms.

V. CONCLUSION

The main aim of this work is to improve network performance in wireless sensor networks using metrics. Current protocols approximation link quality based on the reception of control packets over a short time period. To achieve stable performance in end-to-end transmission delay. A feedback control framework that addresses dynamics at both the link and network layer. It improves quality of service in E2E communication.

REFERENCES

[1] A. Dunkels and Z.He.2007, “An adaptive communication architecture of wireless sensor networks”. In proceedings of ACM SenSys’07.

[2] Y. Gu and T.He.2007, “Data forwarding in extremely low duty cycle sensor networks with unreliable communication links”. In proceedings of ACM Sens’07.

[3] M. Kim and B. Noble.2001, “Mobile network estimation”. In proceedings of ACM Mobicom’01.

[4] K. Srinivasan and S. Agarwal.2008, “The beta-factor: Measuring wireless links burstiness”. In proceedings of ACM SenSys’07.

[5] J. Zhao and R.Govindan.2003. “Understanding packet delivery performance in dense wireless sensor networks”. In proceedings of ACM SenSys’03.