Spatial Reusability with Secure Routing in Wireless Sensor Network

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Abstract : Via precisely thinking about spatial reusability of wireless transmission media, we could enormously enhance end-to-end throughput of multi- hop wireless networks. Multi-hop traffic needs large capacity because the wireless medium has to be distributed within nodes. Consequently, procedures which increment the system capacity are required in wireless mesh networks. We can enhance end-to-end throughput in multi- hop wireless networks, we can achieve that by approach of accurately assuming spatial reusability of wireless connection media. Routing in multi-hop wireless network have some problems to accomplish maximum end-to-end throughput [2]. It is very hard to discover optimal route from source to destination node. In spite of the fact that an extensive amount of routing algorithms have been given to discover route with least transmission time for sending one packet, such transmission time reducing algorithms are not ensured to accomplish high end-to-end throughput. It is critical to deliberately choose optimal path that can enhance end-to-end throughput because of restricted capacity of wireless transmission media as well as lossy wireless connections, particularly in multi-hop wireless networks. Estimation results presents that our algorithms essentially enhance end-to-end throughput. In proposed framework security method is utilized.

IndexTerms **- Hop to Hop to communication, Protocol design, Routing, Wireless network, Security, Throughput Maximization.**

I. INTRODUCTION

Lately, an extensive number of routing algorithm has been given for multi-hop wireless networks. In any case, primary issue with old wireless routing algorithms is that reducing total number of transmissions to convey one packet from sending node to receiving node does not really increase end-to-end throughput. We explore two sorts of routing algorithms, which consists of single-path routing as well as any-path routing. They basically select route that reduces the overall transmission time for sending single packet. In any case, an essential characterstic of wireless transmission media is spatial reusability which recognizes it from conventional wired communication media [5]. We know that majority of old routing algorithms may not consider spatial reusability of wireless transmission media. These algorithms may enormously enhance end-to-end throughput in multi-hop wireless networks. As we know that, we are the only one to especially assume spatial reusability of wireless transmission media in routing. We define issue of spatial reusability aware single-path routing as binary program, and utilize that algorithm for path selection. We additionally research the range of spatial reusability in any-path routing, and consider that protocol for taking part in node collection, cost estimation as well as sending list determination [6]. We have assessed these algorithms in NS2.

The protocols given in this paper, never again require any scheduling, and SASR algorithm may be applied in distributed way. Any-path routing come out as a unique routing approach using the broadcast behavior of wireless verbal exchange media to increase end-to end throughput. In spatial reusability of wireless network signals blur at the time of propagation. On a similar channel, if two connections are free of interference, they can transmit data in the meantime [8]. Wireless networks are developing new technique that will make clients to receive data along with the services from anyplace. It gathers [9] the power of more moderately unsteady paths to build a secure path, by respecting any center node who catches packet to take an interest in packet sending. Many old routing algorithms, whether single path routing or any-path routing algorithms, depend on path quality aware routing metrics. In multi hop communication secure data transmission with minimum cost is ignored. For transmitting message at each node, there will be chances of data hacking. We can utilize encryption as well as decryption at each node. For that we utilize algorithm for cryptography.

II. PREVIOUS WORK

1) This paper[11] shows spatial reusability of wireless transmission media to increase end to end throughput. Because of that purpose, they have two protocols special reusability-aware single-path routing (SASR) and any path routing (SAAR). Estimation result shows that protocols significantly increase end-to-end throughput if we compare them with existing protocols. Author gives one direction to also consider chances to increase execution of routing protocols by evaluating exceptional underperforming cases distinguished in evaluation and improve system performance.

2) This paper[1] displays a link layer protocol known as Multi-radio Unification Protocol or MUP. On one node, MUP organizes activity of various wireless network cards tuned to non-overlapping frequency channels. The objective of MUP is to improve local spectrum use by means of original channel collection in a multi hop wireless network. It portrays design as well as execution of MUP, investigate their achievement by utilizing simulations along with measurements depending on execution. Evaluation results demonstrate that if we consider powerful traffic patterns along with realistic topologies, MUP fundamentally enhances TCP throughput as well as user recognized latency for practical workloads. They intend to research different measurements for channel quality, other adaptable strategy for forwarding probes by utilizing broadcasts along with effect of mobile nodes on MUP.

3) In this paper[12] authors analyze achievement of various multi-hop routing algorithms. They give evaluation of a definite packet-level simulation by differentiating it with four multi-hop wireless ad hoc network routing protocols that cover a scope of design choices: DSDV, TORA, DSR, AODV. When comparing sum of routing overhead packets forwarded by every one of the

protocols, DSR have the most reduced overhead. AODV-LL utilizes Route Discovery method which depends on DSR's, however it makes hop-by-hop routing stage in every node along with route to remove overhead of source routing from data packets. They have extended network simulator to precisely show MAC as well as physical-layer nature of IEEE 802.11 wireless LAN standard which includes practical wireless communication channel model. It shows results of simulation of network of 50 mobile nodes.

4) Opportunistic routing[3] as well as network coding are two important ideas. This paper merges these concepts in simple way to give opportunistic routing with no node coordination. Author introduces MORE, a MAC-independent opportunistic routing protocol. MORE randomly combines packets before sending them. Authors find opportunistic routing that accomplishes high throughput despite of lossy wireless links. The present opportunistic routing protocol, Ex-OR, mixes the MAC with routing, forcing a tough plan on routers approach to medium. In spite of the fact that the scheduler gives opportunistic gains, it slips a portion of inherent characterstics of the 802.11 MAC. For instance, it limits spatial reuse and therefore may underrate the wireless medium. It further removes the layering abstraction, forming protocol little manageable to interchange traffic kinds, for example, multicast.

5) An ad hoc network[7] is gathering of wireless mobile hosts making momentary network beyond any help of current network or centralized administration. Author shows a protocol for routing in ad hoc networks that utilizes dynamic source routing. Unlike routing algorithms utilizing distance vector or link state protocols, this algorithm utilizes dynamic source routing which adjusts rapidly to routing differences when host evolution is frequent. Dynamic source routing protocol is similar to another source routing protocols utilized in wired networks. In this paper author does not give the security matters in wireless networks as well as in packet routing.

6) An ad-hoc network[13] is agreeable commitment of gathering of mobile hosts after necessary interference of any centralized access point. Given routing algorithm permits a gathering of portable PCs, which are not near to any base station and can transfer data with changing and subjective paths of interconnection, to manage the cost of all PCs with a path along which information can be sent to each other. They have introduced an innovative approach, DSDV, which models the mobile computers as routers, which are collaborating to send packets as expected to each other. It is discovered that mobile computers, displayed as switches, can successfully coordinate to assemble ad-hoc networks.

7) The maximum loss rate[10] as well as dynamic nature of connections make routing in wireless mesh networks greatly difficult. Authors show a different routing algorithm that gives opportunistic routing in wireless mesh networks. In any-path routing, every node utilizes both an arrangement of next hops as well as chose transmission rate to achieve destination. Any-path routing has been newly planned as an approach to avoid these limitations by utilizing various next hops for every destination. This approach presents two major disadvantages. To start with, utilizing one rate over the whole network. Secondly, the network may end up separated at a higher bit rate. They have given a answer to integrating opportunistic routing along with various transmission rates.

8) Network coding[14] can enhance network throughput by permitting middle nodes to merge or encode the information they receive, instead of duplicating and sending it. This paper assume optimal routing, scheduling as well as network coding methods to increase throughput in wireless networks. It gives k-tuple coding, a generalization of coding with next-hop decodability, and characterize region of new rates for which the network queues may be stabilized with the help of this coding strategy. Authors evaluated LCM-Frame approach with the help of packet simulation along with LP evaluation for pair wise as well as 3-tuple coding.

9) This paper[15] shows an optimization scheme for addressing difficulties of multi-path routing in wireless mesh networks. We have broadened existing activity by joining broadcast behavior of wireless network.

10) We find the issue[16] of discovering the biggest number of connections that can be formed one by one in wireless mesh network related to interference, radio along with connectivity limitations. The main objective is to activate each and every link.

11) We exhibit[17] basic protocol that can effectively enhance the process of opportunistic routing in IEEE 802.11 networks. This system contains three important parts:

a) Basic, anyway effective, wireless network model to help optimization,

b) Different algorithm for improving a few performance objectives,

c) An opportunistic routing protocol that successfully give solutions came about because of our optimization into practical routing designs.

12) In this paper[18], we find the effects of these components and in addition diverse other critical factors, for example, SINR (signal to interference plus noise ratio),node topology, terminal issues as well as both direction handshakes, on finding ideal carrier sensing scope to increase the throughput by using both analysis as well as simulations.

13) We have suggested EMTT [19]as powerful metric for obtaining great performance multicast routing in multi-rate WMNs. EMTT catches collected effects of-

a) MAC-layer retransmission-based reliability,

b) Transmission rate dissimilarity

c) Wireless broadcast benefit,

d) Link quality alertness.

14) To increase [20]or to evaluate the execution of these kinds of networks, one should have a little information of which connections in the network middle with each other. In any case, the issue of evaluating the interference among links of a multihop wireless network is a challenging one.

15) Opportunistic routing[21] essentially improve unicast throughput in wireless mesh networks by adequately using the wireless broadcast medium. Opportunistic routing is executed in a uncomplicated along with practical route without depending on complicated scheduling protocol with the help of network coding.

III. METHODOLOGY

The essential issue is to create an efficient, robust, scalable routing for reusability of routing algorithm secure along with trustable routing in wireless routing is very difficult for multihop routing which is used for sending packet data. Network lifetime expansion is greater threat in wireless sensor network. The main goals are

1) Reduce Delay: The delay require to decrease in multi-path routing.

2) Load Balancing: Traffic sharing is not equivalent in every links in the network, increasing the traffic on various routes can ease bottleneck in few links.

3) Reliability as well as fault tolerance: The first thought for utilizing multipath routing methodology in WSN is to give way strength along with reliable data transmission. In fault tolerance area, at whatever point a sensor node cannot send its data packets close to the sink, it can get advantage from availability of other paths to rescue its data packets from node or link breakdowns.

Routing protocols are particularly implemented depending on transmission rate minimizing routing metrics, they cannot ensure high end-to-end throughput even if we consider spatial reusability. They require centralized regulation to acknowledge MAC-layer scheduling as well as to remove transmission conflict. These protocols which are mentioned in this process do not need any kind of scheduling. The way could be continued to adjust to different various transmission rates, as we can calculate links of conflict graph. The expected system prompt to just choose the route that limits general transmission time for sending single packet. In an adhoc network wireless sensor nodes building a network without utilization of any current network framework authority. That restrict transmission range of wireless network devices. If a single node wants to transfer information with other node across the network, it requires various network hops. In this way, different kinds of routing protocols targeted particularly at this surroundings are developed. In existing system there are some disadvantages. If a wireless node picks a channel that is symmetrical to the channel picked by its neighbors, at that point these neighboring nodes aren't capable of communicating with one another. Energy consumption was bigger challenge to wireless sensor network. In spite of the fact that a huge range of routing protocols are authorized to discover the route with less transmission time for causing one packet, such transmission time protocols can't be sure to accomplish high end-to-end throughput. SASR as well as SAAR protocols assume each condition to accomplish high end to end throughput. SAAR algorithm limits the packets which are to be sent over preset path from sender to receiver; any path routing allows each middle node who catches packet to take part in data packet sending.

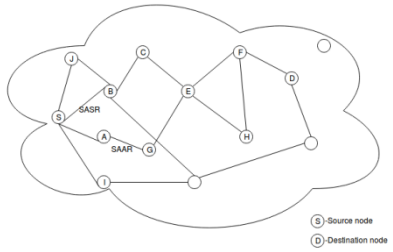

Fig. 1. Algorithms

- SASR: The main function of this routing protocol is to choose a cost reducing route, with which packets are sent from sender node to receiver node. Two integral algorithms are proposed for route selection. When one classification (SASR-MIN and SASR-FF) gives accomplishment of performance of routes, another classification (SASR-MAX) estimates work of routes in worst case. SASR limits the number of packets to be sent through fixed route from sender node to receiver node. SASR algorithms is executed in distributed way.
- SAAR: Any-path routing show as a different routing techniques accomplishing broadcast behavior of wireless transmission media to increase end-to-end throughput. SAAR algorithm limits the packets to be sent through a fixed path from sender to receiver. It gathers the strength of moderately uncertain paths to create stable path, by respecting each middle node who catches the packet to take part in packet sending.

Drawback of Existing system:

1. Energy utilization was greater challenge to wireless sensor network.
2. In multi hop communication secure data transmission with less cost is ignored.

In multi-hop communication secure information transmission with less value is neglected. Existing framework is badly arranged to utilize, mobile users should be prepared to connect over the development of an ad-hoc network. For transmission message at every node, there'll be probabilities of data hacking. In this way we will give our contribution in security format. We will utilize encoding and decoding at every node. For that we utilize RSA algorithm for cryptography. In our paper, we have implemented different algorithms, for example SASR, SAAR and RSA algorithm for key generation.

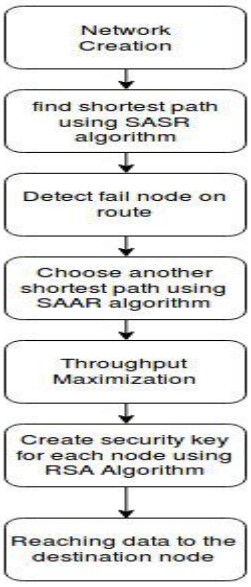

Fig.2. Proposed Architecture

Non-Functional Requirement

1. Performance: There are wide range of approaches to measure the performance of a network, as each network is diverse in nature and design. Performance measuring in bandwidth, throughput, latency, jitter, error rate and so on.
2. Scalability: Scalability is the capacity of system, network, or procedure to deal with a developing measure of work, or its capability to be extended with a specific end goal to suit that development. For instance, it can assign to the ability of a system to expand its overall output under increasing load whenever resources are included.
3. Capacity :Wireless carriers are forced to enhance the network ability to hold user demand for high-bandwidth utility. Until lately, users utilized wireless networks to compose messages or calls. Now a days, capacity is necessary to deal with subscribers as well as extra services.
4. Availability: When data is not secure and easily accessible, data security is affected. Another factor influencing availability is time.
5. Reliability: A reliable protocol gives reliability characterstics related to the delivery of information to expected receiver, instead of an unreliable protocol and this protocol does not give notifications to sender with regards to the delivery of transmitted information.
6. Security: Network security includes the approval of handling data in a network and it is composed by network controller.

We study stationary multi-hop wireless system with collection of N nodes. For accuracy, we consider that nodes do not utilize any power control design in this module but can utilize a similar transmission rate. As we know that wireless signal fades during propagation, if two wireless links are spatially distant enough from each other then they can work at the same time. We consider non-interfering set I, in that set two links are not present within interference range of one another. To demonstrate the impact of spatial reusability in wireless routing, we think about two ways as shown in Fig. 3.

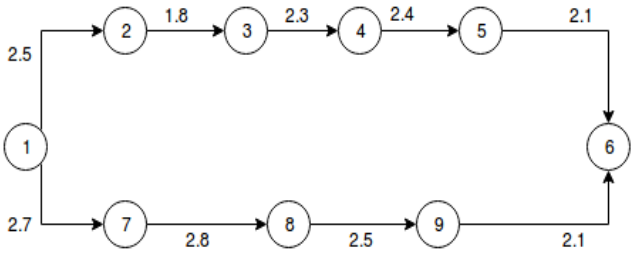

Fig.3. Example

In Fig. 3, there're two routes between source node 1 and destination node 6. They are route I with 5 hops and route II with 4 hops. The ETX value of each hop is shown adjacent to the links in the figure. Note that the first and the last hop on route I can work at the same time without interfering each other, while there're no such link pair on route II. For comfort, we characterize such sort of link pair to be a reuse pair. By the ETX metric, route II is preferred because its ETX total, which is 10.1, is smaller than the value 11.1 of route I. However, considering the fact that link (1-2) and (5-6) can work in the meanwhile, they together do not need to consume as much bandwidth as two sequential hops. Therefore if we subtract the weight of link (5-6) from route I's ETX, it will get smaller ETX than route II instead; and by estimation, route I can accomplish a 10% higher throughput than route II because the first four hops on route I have better quality compared with the hops on route II. Fig.-3 exhibits the raw ETX metric's drawback of ignoring the possibility of "spatial reusability" between links. Proposed framework details data spread utilizing multipath routing to minimize packet losses and relieve delay in packet transmission.

IV. RESULTS

The estimation results indicate that algorithms fundamentally enhance the end-to-end throughput as compared to existing algorithms. Results also show that security key is generated during packet transmission. This increases energy as well as lifetime of the network. Node to node communication takes place with security. With the help of trust based active source routing, it can minimize packet drop attack. These are the benefits of proposed system. We have plotted different types of graphs including energy consumption, average throughput, packet delivery ratio and control packet overhead.

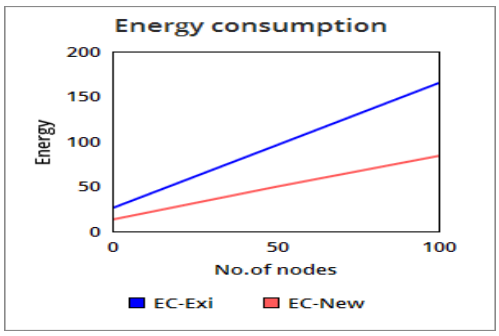

Fig.4.Energy Consumption

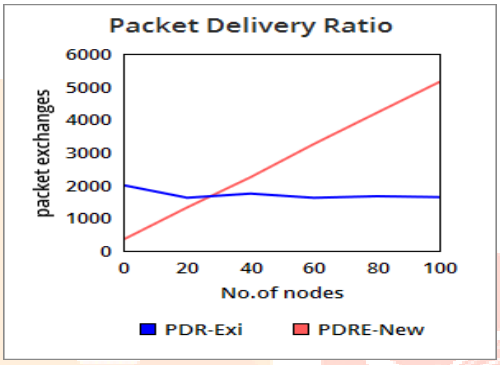

Fig.5.Packet Delivery Ratio

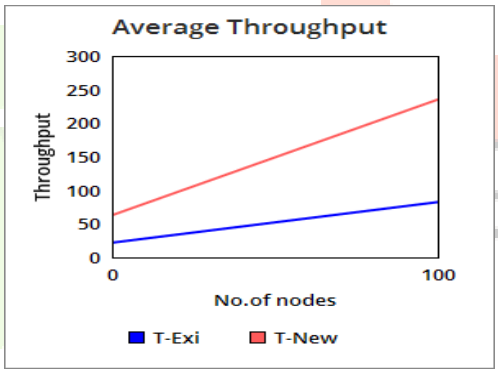

Fig.6.Average Throughput

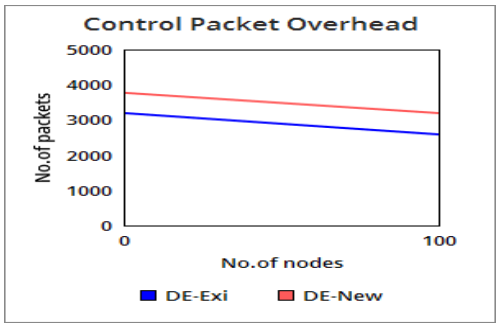

Fig.7.Control packet overhead

V. CONCLUSION

In this paper, spatial reusability aware routing can proficiently enhance the communication between source and destination with high end to end throughput in multi-hop wireless networks, by properly thinking about spatial reusability of wireless transmission media. We have additionally executed our algorithms, and correlate them with current routing protocols with different data rates. Evaluation outcome demonstrate that SASR as well as SAAR algorithms can accomplish higher end-to-end throughput gain if we consider higher data rates. We have created security key for each and every node present in the network. It provides more secured data transmission in wireless networks.

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