

Secure Direction-finding Protocols and QoS for WSN for Diverse Applications-A Review

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Abstract

Wireless Sensor Network (WSN) accomplishes vigorous role in automation using different kinds of sensors. WSN supports many fields similar to medical, home appliances, home automation, and military, industry and navigation's etc. WSN having main functions to monitor the environment and gather the data for predefined applications. The performance of WSN basically based on routing performance. Quality of Services (QoS) enhances the performance of routing. WSNs degrades the performance due to more energy consumptions of sensor nodes, less network lifetime, message delivery success rate, cost and network security. Researchers are developing existing routing algorithms and routing protocols still WSN degrades the performance. Researcher's had provided different solution for security purpose. We enlarged on the same paper, the basic things of WSN which will help to improve the routing performance of WSN. Similarly; we proposed solution for routing security.

Keywords-WSN, routing, QoS, Security

1. Introduction

Wireless Sensor Network (WSN) lengthily using for different application now a days. Many researchers are working on WSN by considering different issues. It is a best platform for researcher's to do work on different parameters. Selection of topology is very important tasks in SG. Many researchers are using Mesh topology for designing WSN for different applications. Mesh topology supports numerous protocols. The basic requirement of WSN is transferring information accurately to the correct destination. It is a challenging work. The performance of WSN calculated through packet collision, traffic congestion, throughput, Delay. Unremitting monitoring is an exceptional issue of WSN [1]. WSN consists several kinds of sensors for operation, based on operation sensors has to be depends. Routing is very important step in WSN concert. Selection of routing protocols based on the different applications. Routing faces basically two problems 1. Network lifetime 2. Energy consumption [2]. Routing is based on number of parameters in WSN. Multi-hop approach is best solution in routing to transfer the packets from sensor nodes to the destination [3]. In route selection in routing specially take care of node selection considering the security issue in WSN. Energy saving is a challenging work in WSN [4]. Clustering always tries to improve lifetime of sensor nodes. WSN supports eclectic range of applications [5-6]. Routing protocol for mobile WSN should be lightweight. Mobile WSN are consists different mobile sensor nodes for different applications [7]. In WSN for undeviating energy feasting instead of upended mobile sinks can be used. To maintain the throughput and less delay sensor node have to aware mobile sink's current location [8]. The architecture of WSN based on three important components 1. Sink 2. Cluster Head (CH) 3. Cluster member (CM) [9]. Table 1. provides information related to routing protocols, algorithms and different methodologies to improve the performance of WSN.

Ref. No.	Considered protocol / algorithm /methodology for WSN routing	Considered architecture of WSN	advantage
4.	Opportunistic Multi-Hop Routing, Optimal Forwarder List Selection in Opportunistic Routing,	Wireless Sensor Network	Efficiency, throughput, reliability, tried to support different energy saving technique
5.	LEACH-WSN,clustering	Wireless Sensor Network	Energy Consumption ,Network Lifetime
7.	propo-sition routing protocol	Mobile WSN	energy consumption, load-balancing
8.	Hierarchical routing protocol	WSN with mobile sink	minimizing the overhead, Energy Consumption
9.	Energy aware routing, Finite state machine	Wireless Sensor Network	Increases lifetime of network, throughput

Table1.Routing protocols with their advantages for WSN

From the table 1, it clears that many researchers are working on different technical issues of WSN.For energy consumption and network’s lifetime is the big issues of WSN.Numerous protocols and algorithms invented for the same issue of WSN still WSN degrades the performance due to the same issue.

1.1WSN Architecture

WSN used comprehensively different applications. The main function of WSN to monitor and control the system. The main components of WSN 1.Sensor 2.Base station 3.Communication module and communication technology.

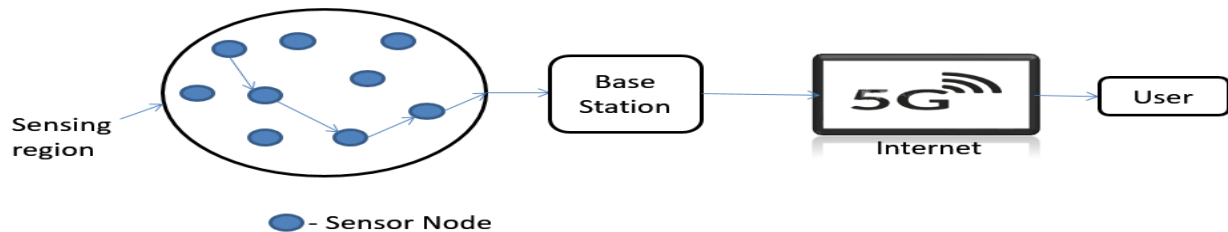


Fig1-WSN architecture

Figure 1.supports to WSN working principal. Sensor nodes performs very vital role in WSN. Nodes delivers virtuous enactment if the routing technique assortment was respectable [2].For enlargement of WSN architecture clustering is one of the best option. Sensor nodes are separated in to minor clusters. And its effect on QoS of routing of WSN. QoS enhance their performance due to clustering [3].In this paper for wireless communication 5G technology preferred due to its characteristics. User can access data in WSN through internet. For some application instead of sensor node, mobile sensor nodes are uses for large rang applications. Tractability management is a big issue in this case and it is a challenging work [7].Mobile sink provides facility to do uniformly energy consumption [8].Clustering tries to improve the performance of WSN architecture by increasing the lifetime of network [9].

2. QoS of WSN

WSN have a lot of issues related to QoS. These issues overcome by inventing Wireless Multimedia Sensor Network (WMSN).WMSN uses wireless sensors and connected in heterogeneous mode. QoS continuously try to deliver faithful service at the end node.Acheivement of QoS for WSN at a desired level is a challenging work. The performance of WSN and WMSN basically depends on selection of routing

protocols and algorithms. For the virtuous routine instead of single path routing mostly multipath routing preferred. Fault tolerant routing basically used for critical monitoring applications [10].

Table2.QoS parameters for WSN

Huge energy consumption of different sensor nodes in WSN is big issues, considered by several researchers', still WSN vitiate the enactment due to the same reason. Table 2 provides information of different QoS of WSN.The routing performance of WSN basically depends on QoS [1-15].Different routing protocols and algorithms tried to improve the QoS still it didn't fulfilled all the requirements of QoS.

Ref. No.	Considered architecture of WSN	PDR	Delay	Jitter	Energy consumption	Grid lifetime	cost	Throughput	Message Success rate
1.	Linear WSN					✓	✓		
2.	WSN	✓	✓	✓	✓	✓	✓	✓	
3.					✓	✓	✓		
4.			✓		✓	✓	✓	✓	
5.		✓			✓	✓	✓	✓	
6.		✓	✓		✓	✓	✓	✓	
7.					✓	✓	✓	✓	
8.		✓	✓		✓	✓	✓	✓	
9.					✓	✓		✓	
10.		✓	✓	✓	✓	✓	✓	✓	
11.		✓	✓		✓				✓
12.					✓	✓			
13.					✓		✓	✓	
14.					✓	✓	✓		✓
15.		✓	✓	✓	✓	✓	✓	✓	✓

3. Attacks on WSN based on routing

For the tremendous performance of WSN we have to provide security. Generally the security needed for different kinds of network which is used in WSN.Table 3 provides very robust information related to security improvement. Many researcher's had worked on the same issue and still the problem not solved yet.

Ref. No.	Proposed algorithm/protocols/methodology for routing security	attacks	Simulation platform
2.	tree-based diversionary	direction-oriented attack	
6.	OLSR& AOMDV	jamming attack,data collision attack, tunnel or wormhole attack, IP spoofing	NS2,NS3
9.	EAR(LEACH and LEACH-C) algorithm	energy hole attack	MATLAB
15.	EFMRP scheme	single-link attack, malicious attacks	
16.	GLBCA, GA, LDC.	wormhole attack, sinkhole attack, Sybil attack, Selective forward attack	MATLAB
17.	SRPMA	black hole attack	NS2
18.	wolf pack algorithm (CLWPA)	wolf scout attacks	Matlab2018-b
19.	EAR,FSM	energy hole attack	MATLAB

Table3.Attacks on WSN, their solution and simulation platform

Table3.Attacks on WSN, their solution and simulation platform

Selection of simulation platform is similarly very important task in any operation. Numerous researchers had used MATLAB and NS2, NS3 for the calculation of performance. From the literature survey it is clear

that, principally attacker attack on network which is considered for operation of WSN. Particularly wormhole attacks, wolf scout attacks considered for improvement of security for WSN.

4. Diverse Applications of WSN

WSN is a best platform for monitoring purpose. Table 4 gives application based information of WSN. It has diverse applications. The main interest of many researchers' had based on performance parameters likewise cost and energy efficiency. Self-organizing is an one of the best feature of WSN. For vehicular traffic control applications based on WSN end to end security and reliability should be required [21].

Ref. No.	Considered Application of WSN	Considered performance parameters for particular application
1.	Monitoring of Over-ground Pipelines	Low cost, energy efficiency
20.	biomedical applications	Latency, compression rate
21.	vehicular traffic control applications	Realibility, Security

Table 4. Different applications and performance parameters of WSN

For smart agriculture based applications of WSN should be consider two important systems 1. Fuzzy logic system 2. Artificial neural networks [21]. By providing these two methods agriculture system will be developing more and more. Performance parameters commonly having problems are lifetime, energy consumption, delay and cost of WSN based application.

5. Conclusion

WSN is a one of the proficient platform for monitoring based applications. Due to self-configuring, WSN enhances the performance of any system. Security is a one of the important performance characteristics of WSN. Routing security enhanced by providing different algorithms and protocols. Still routing security issue not solved yet. QoS of WSN having many problems due to energy consumption, packet loss and lifetime of nodes. Reserchers have lot of work to do base on WSN.

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