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A Review on Recent Routing Protocols in Field of Wireless Communication

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Abstract: ***Routing is used to find the shortest distance between the different nodes from source to destination. Routing is basically used to find the efficient path to send the packets from source to destination. In the traditional technique, the main focus was on the distance. But as the time passes, so many issues took place which becomes a hindrance for achieving efficient routing in WSN. This study provides an overview to the concept of routing. The type of routing is also discussed under this in section 1. Section 2 represents the various issues and challenges that falls on the way to achieve effective route for data transfer. Section 3 represents the concept of trust based routing, in which all the trust models are defined in brief along with their pros and cons. Section 4 represents the work that already had been done in this work. Section 5 is winding up of the study by presenting the whole research in brief.***

Keyword: Wireless Sensor Network, Clustering, Routing, Trust Value, Quality of Services.

I. INTRODUCTION

Routing is a process which is used for transferring a message from sender to receiver. In routing, forwarded message follows a route to receiver node. Route is made up by connecting the nodes with each other. It is performed on telephone network, electronic data networks and transportation networks. We are focusing on the electronic data networks such as internet in this report.

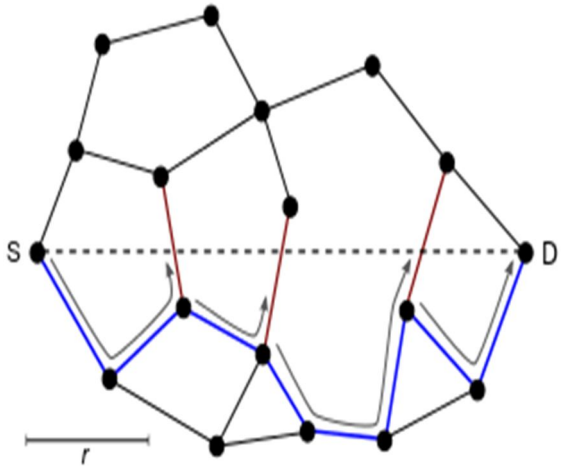

Figure1: example of Routing [27]

The diagram (Figure 1) shows the basic working of routing where there is a source and destination from where data packet has to be sent. And the defined route (shortest and less congested) has been selected for the communication.

Packet switching networks and general purpose computers do routing whereas in packet switching network, packets are routed from source to destination through the intermediate nodes known as network hardware devices (routers, bridges, gateways, switches) and general purpose computers also routes packets from source to destination but there is not specialized hardware thus it may suffer from limited performance. [8] The process routing involves the routing tables that contain the information about the routers and their routing paths as well to the destination. Consequently, construction of routing tables are efficient part of the routing as it is going to be stored in the memory of the routers. Path chose by the routing algorithm depends upon the type of algorithm as most routing algorithm choose one path at a time but in case of multipath routing techniques, choose multiple alternative path for communication. Routing path that are overlapped or have equal routes described in the routing tables are installed in terms of priority:

A. Prefix-Length

Where subnet masks length is longer are preferred.

B. Metric

According to this parameter, a lower metric cost is preferred valid in one and same routing protocol.

C. Administrative Distance

Learned route from a more reliable routing protocol is preferred valid between different routing protocols. To represent the route, a single routing table has been assigned in structured addresses thus in large networks, structured addressing performs better than unstructured addressing. As the technology enhances, routing is becoming prominent technology on the internet. Unstructured addressing or bridging is used within localized environments. [10] Routing is also differs in terms of its types. Some of them are

D. Unicast that Provides Delivery to a Single Specific Node

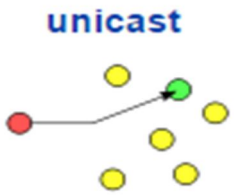

Figure2: Unicast Routing [27]

E. Broadcast that Delivers a Single Message to all the Nodes Available in the Network

Figure 3: Broadcast Routing [27]

F. Multicast Delivers the Message to that Group of Nodes Who Shows Interest in Receiving the Message

Figure 4: Multicast Routing [27]

G. Anycast Delivers the Message to any Node Basically Which is Nearest to the Source

Figure 5: Any cast Routing [27]

H. Geocast that Transforms the Message to Geographic Area

Figure 6: Geocast Routing [27]

From all these routing techniques, unicast is the dominant one and in this report we are using it for routing algorithms. After the discussion of the routing casting types, now we will describe the nature of the routing which means whether the routing is static or dynamic?

In static or non-dynamic routing, manually configured routing tables has been used. These types of routing are considered for small networks as there is more chances of direct route to be blocked soon which is the basic drawback of this network.[22] Example of static routing is PSTN i.e. public switched telephone network. Thus, for the large networks, we must find another way as it is not feasible. Static networks using pre computing routing tables but in case of dynamic ad hoc networks, routing tables generated according to the traffic at present on the network automatically.[23] This network gets their info from routing protocols. It will helps in avoiding failures and blockages in network. Dynamic routing algorithms are used in routing information protocol i.e. RIP and open-shortest-path-first-protocol i.e. OSPF. It is the most emerging technology in routing and dominates the internet.

II. ROUTING CHALLENGES AND DESIGN ISSUES

Depending on the application, different architectures and design goals/constraints have been considered for sensor networks.

A. Node Deployment

It is application dependent and affects the performance of the routing protocol. The deployment is either deterministic or self-organizing. Deterministic node deployment refers to the installing the nodes manually whereas in self-organizing the nodes are installed manually.

B. Power Consumption

Since the transmission power of a wireless radio is proportional to distance, multi-hop routing i.e. route through multiple nodes consumes less amount of energy whereas in single hop routing the higher amount of energy is consumed by the communication process.

C. Data Aggregation/Fusion

In case of multi-hop routing the problem of data aggregation exists. Data aggregation is a process in which the data from multiple hops is collected at one. The data collection or aggregation can be done by using the commands like suppression, min and max etc. As computation would be less energy consuming than communication, substantial energy savings can be obtained through data aggregation.

D. Node capabilities

Depending on the application a node can be dedicated to a particular special function such as relaying, sensing and aggregation since appealing these functionalities at the same time on a node might quickly drain the energy of that node.

E. Lifetime of Nodes

Lifetime of nodes is determined by the amount of remaining energy at the nodes. If the remaining energy at a node is zero then the node will be declared as dead node. If nodes consumes higher amount of energy for data transferring or communication then the

amount of remaining energy will be nil due to which the nodes will be declared as dead. The greater number of dead nodes in a network leads to the slower processing and degrades the process of the networks.

III. TRUST MODEL BASED ROUTING

Trust Value has a valid and imperative value in case of Wireless Sensor Network. WSN consists of small sensor nodes and trust value is related to these sensor nodes. The reliability and trust worthiness of nodes is represented in the terms of trust values. It highly depends upon the nature of the task. On the basis of this criterion it is divided into two categories as follows:

A. Social Trust
B. QoS Trust

In social trust consider truthfulness, and solitude, altruism and connectivity factors of a node. QoS consider power, energy, task completion capacity of nodes, reliability etc.

Generally trust is classified in two categories such as behavioral trust which stands for trust worthiness between user and organization, and computational trust defines the trust worthiness between computers devices and networks.

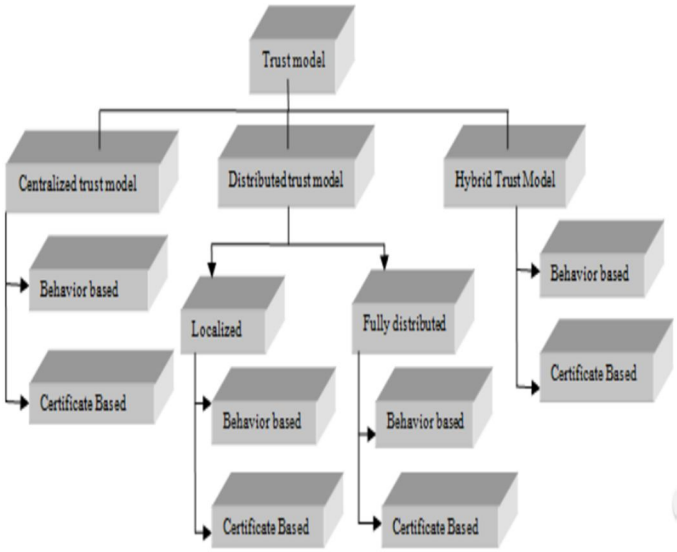

Figure7 Taxonomy of Trust Model

C. The figure 7 describes the Taxonomy of Trust Model. Accordingly Trust Model have Three Categories as Follows

1) Centralized Trust Model
2) Distributed Trust Model
3) Hybrid trust model

Table1. Pros and Cons of Trust Models

Structure	Pros	Cons
Centralized	Less complex calculations and consumption of memory	Communication transparency, less reliability and scalability
Distributed	High reliability and scalability	Complex calculations
Hybrid	Less communication overhead than centralized and less memory	Large computational overhead than centralized, large memory requirement than centralized , less reliable and scalable compared to distributed

Centralized Trust Model contains a centralized server which calculates the trust value of all of the nodes in the network.
In Distributed Trust Model the trust value of the each and every node is calculated individually or locally. Every node evaluates locally the trust value of other nodes which led to the enhancement in the complexity of calculations which indirectly increases the computational outlay. In this model a table is maintained regarding the updated records of trust values for whole network.
Hybrid Trust Model is the combination of both the trust models i.e. centralized model and distributed model.
The advantages and disadvantages regarding three trust model is represented in the table below (table 1).

IV. RELATED WORK

A. Cheng-Fu Chou (2005), [1] proposed straight line routing algorithm i.e. SLR that is being used in wireless sensor network. SLR algorithm does not want any type of geographic information to find the event and query path for a network. SLR performed better in comparison with rumor routing in terms of energy consumption, path quality and ratio of successful routing. SLR saves more energy consumption and ratio of finding a best path improves.

B. Rani, P.K. (2014), [2] focus on the advent of next hop graph which is generated through the ring based super node structure. Results show that the proposed technique performed better in terms of accuracy, connectivity and topological characteristics also. Proposed approach follows the graph and cut algorithm where SLR evaluates the optimal path for data transmission. Experiments have shown that the proposed algorithm provides accuracy and efficacy.

C. Adnan Fida (2014), [3] proposed a route optimization technique known as COMPARE named as communication and position aware reconfigurable route optimization which provides end to end transmission. Route has selected after checking the quality of the link of the network through the probability of the successfully receiving packets over a link. After the selection of the path, route is reconfigured. At the end, experiments have been performed and results show that proposed approach is better than conventional approach.

D. Prosenjit Bose (2001), [4] focused on the unit graphs for communication where nodes are defined as points in the plane and two nodes can communicate with each other only if the distance between these two nodes is less than some fixed unit defined earlier. Firstly distributed algorithm has been used for routing but there should be no duplication of packets and also ensures that the packet reached at the destination. After this algorithm further broadcasting and geo-casting can also be used. Simulations have been performed and results show the performance of different algorithm.

E. Xiaocong Jin (2014), [5] focused on the geographic routing protocol named as “TIGHT” used for radio mobile ad hoc networks. This proposed approach offers primary user and secondary users in which secondary users can use the whole channel without affecting the primary users in a network. TIGHT provides three modes such as greedy nodes, optimal and suboptimal nodes. In the greedy mode, packet routes from the greedy geographic forwarding and reaches at the primary users region and then routes the packets around the primary user region from where greedy forwarding resume. Primary users may active occasionally so it works best in that condition. On the hand optimal and suboptimal modes works best when primary users remain active most of the time. Experiments have been performed to check the performance of the TIGHT.

F. Charu Wahi (2012), [6] Mobile ad hoc network is defined without the help of any centralized infrastructure. Thus due to the nodes mobility, network do not follow the same criteria or topology for the network. From several years, different techniques have been proposed and developed to obtain highly efficient network for mobile ad hoc networks. This paper involves number of techniques, their comparison and representation in a network. Simulations have been performed under different scenario.

G. Parminder Kaur (2012), [7] in this paper routing protocols are used to distribute the energy within a network efficiently. Data gathering and transmission has done through the proposed approach known as CHIRON named as Chain based hierarchical routing protocol. This proposed technique is helpful in transmits the gathered data to the chain leaders. One chain leader sends the data to another chain leader having same covering angle. This process continues in a sequential manner results that it is helpful in reducing energy consumption as well as the lifetime of the network.

H. Alex Hinds (2013), [8] revolves around the MANET protocols, its functionality from earlier (DSDV) to advanced protocols (MAODV), their improvements and developments etc. This paper considers the researched work in MANET technology and simulation results shows the performance of available protocols.

V. CONCLUSION

In this section it is concluded that the objective behind this study is to have a deep knowledge regarding routing and its various aspects like factors that can influence the process of routing. Large and complex technique has been developed for routing but these were not so efficient. As in earlier Wireless Sensor Network protocols are used to improve the energy efficiency and to enhance the lifetime of the network. In this process first of all the whole network is divided into small clusters. The number of these clusters can vary from network to network. And then from these clusters, cluster heads are selected then cluster heads collect the sensed data form clusters and then forward this collected data to the base station and sink node. The only problem in traditional work was the criteria opted for selection of cluster heads. Earlier only trust value was considered for selecting the cluster heads. The node having maximum trust value was selected as a cluster head. Additionally none of the algorithm had been applied to the network for the purpose of optimization. This increases the efficiency of the network but only up to certain limited point. This process leads to the reduction in security of the network as a single node can become cluster head again and again. Therefore the main problem was less number of parameters was considered for cluster head selection.

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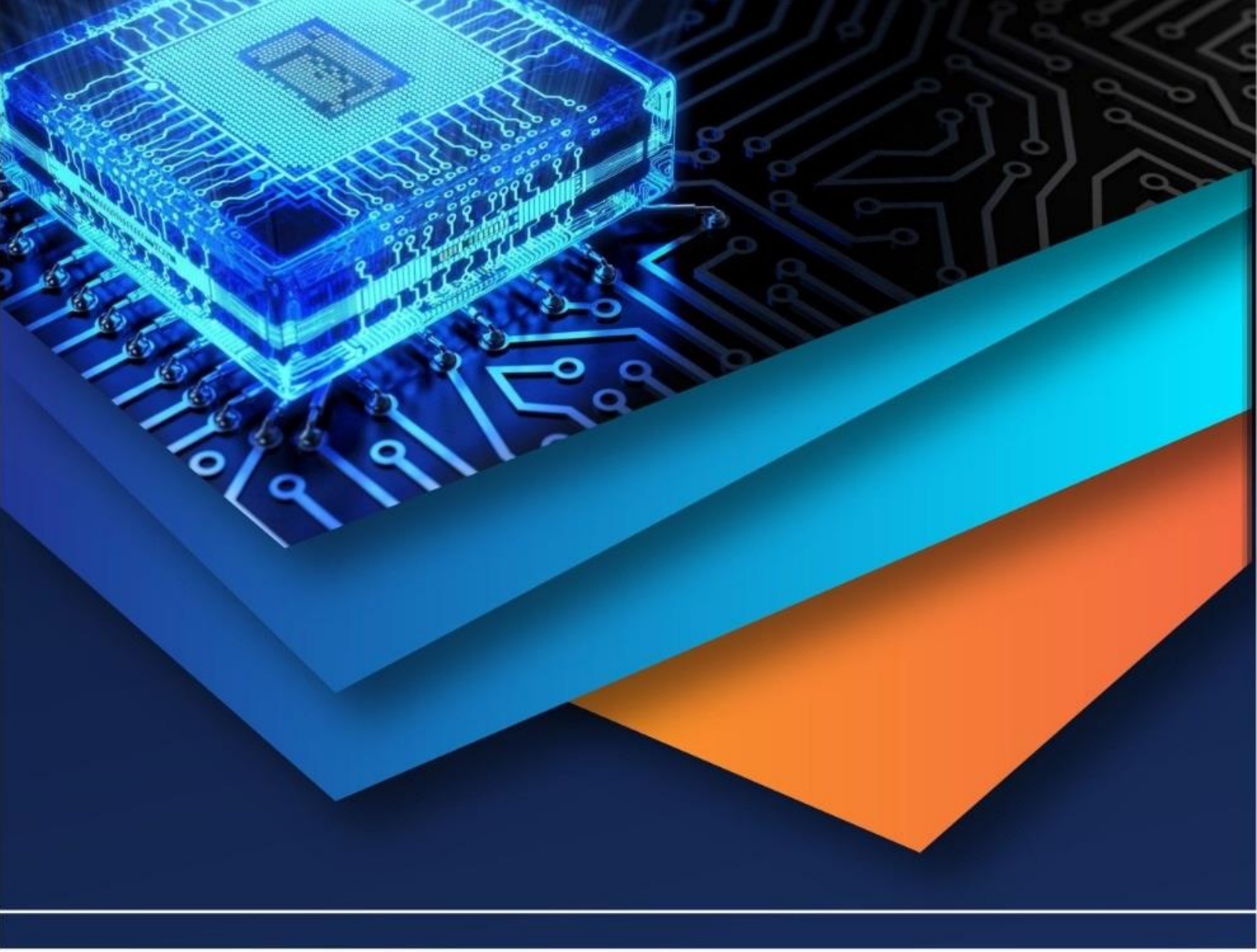

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