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A Survey of Geographical Routing over Mobile Ad hoc Network

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Abstract- Geographical routing uses physical location for routing process and routing protocols are topology free and they can easily adopt the dynamic behavior of wireless ad-hoc networks. Routing protocols support various submissions ranging from mobility estimation and management through to unidentified routing and energy efficiency for QoS. Large networks use this routing in environment of awareness due to working with location data for routing judgments and thus represent an significant phase in the journey towards ever-present computing. Geographical routing protocols should have resource awareness in order to utilize the distributed resources efficiently. In this survey paper, we will discuss the various methods developed by researchers for resources aware routing and their efficient utilization.
Keywords- Ad hoc Networks, Geographical routing, resource awareness, efficiency

I. INTRODUCTION

MANET has the imperfect properties and there is need to maintain all that for long term network operations. Resource management is the well-organized and active placement of resources when they are required, it contains these subsequent: Transmission power management, Battery energy management, Processor power management and Device power management etc.
All these suffer from the behavior of the geo routing protocol and the way buffers are managed at node level [12]. Geographical routing protocols are topological independent, developed for large and distributed network operations. Following are the issues related to their design and development:

A. Location Dependency

Routing information is built on the basis of node location. Frequent location updates may produce the extra control overhead in the network. Accuracy of Node Location depends upon the sensitivity of the device and it may lead to the unexpected location errors. If beacons are used for location updates then it is necessary to regulate the frequency of the Beaconing otherwise it may lead location errors.

B. Mobility Patterns

Variations in mobility patterns of nodes may cause the location errors as well as it can also introduce the extra control overhead in network.
Secure Routing: Secure routing is an another issues related to geo routing because malicious nodes can easily capture the location data of the victim nodes.

C. Resource Management

Nodes are deployed in different geo locations so it is very complicated to know the resource consumption at node level. If nodes are consuming more resources than it may have impact over the efficiency of the entire network.
Following are the two different methods which can be used in Geographical routing:

D. Greedy forwarding

In this scheme, Sender finds the nearest nodes to the destination for packet delivery. Each node follows the same steps for next hope selection.

E. Face Routing

This scheme can be considered as an alternate to the Greedy forwarding scheme that suffers from the local maximum problem. Face Routing works on the basis of Planner graph theory. Planner Graph contains Regions and Edges. All intersection links between

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sender and receiver are considered by face routing and finally nearest intersections to receiver are selected for packet forwarding. [1]

F. Hybrid Greedy-Face Routing

This approach uses the combination of both schemes discussed above. Routing information is build on the basis of Greedy forwarding scheme and later on face routing scheme is used to avoid the local maximum problem. Depends upon the topological information, Protocol can decide to switch into other scheme.[1]

II. LITERATURE REVIEW

Fraser Cadger et al. [1] did a comprehensive and methodical survey explored advantages of geographic routings over the wireless ad-hoc networks. They focused on the issues related to QoS, security, mobility management and energy efficiency. They also identify some new issues those are needed to be explored further. They considered the different properties for a QoS-supporting ad hoc routing algorithm such as Robustness and ability to degrade gracefully as mobility increases, Local route computation (i.e. no need to store global topology), Chosen route should be able to maintain request bandwidth level for flow duration, Broadcast should be avoided and route selection conducted with minimal network overhead, Nodes should be able to utilize connections quickly etc. in case of Geographical Routing Security, they considered the malicious behavior of nodes and the way to identify them, packet-snooping techniques and the security methods for all these security threats. explored the advantages of geographic routings over wireless ad-hoc networks. They considered various issues related to security, energy efficiency, QoS and mobility management. They also identified some new issues those are needed to be explored further. They considered the parameters such as Robustness, mobility, Local route computation, bandwidth and overhead etc.

Zhongliang Zhao et al. [2] proposed TLG Topology and Link quality aware Geographical opportunistic [2]. It works with multiple network metrics such as link quality and network topology, geometric position to implement the coordination mechanism of OR. They compared TLG with existing solutions and simulation results show that TLG can maintain the QoS provision. developed a Topology and Link quality-aware Geographical opportunistic routing protocol that forms a metrics on the basis of network topology, link quality, and geographic location etc. They compared the proposed scheme with existing solutions under the constraints of QoS parameters.

Hyochun Ahn et al. [3] presented a new multi-metric geographical routing protocol for tactical ad hoc networks. It supports unique traffic characteristics of tactical operations and offers multiple routing metrics for all type media and short message data. After computing metric of interfaces, one of interfaces in the set can be chosen. Source node is aware from the location and distance of every node and data can be transmitted to the nearest node from the end point node. In process no extra routing control packets such as RREQ and RREP to be generated among nodes. Simulation results show that the proposed scheme outperforms than simple GPSR scheme in terms of end-to-end delay, throughput and low overhead .It can also perform well in mobile network environment and may be suitable for real time applications proposed a geographical routing protocol for multi-radio, multi-band tactical ad hoc networks that can use multiple routing metrics with multiple radio interfaces having different frequency bands. Simulation results show the performance of this scheme in terms of efficiency and QoS requirement in ad hoc networks.

R. Rajendran et al. [4] presented Preferred and Contention Based Forwarding (PCBF) for geographical routing. It uses contention as metric to make routing decisions thus results in reduction of delay. It can distribute the packets to a particular geographical location. Authors evaluated the proposed method with the existing one (EMDV) and show that it can perform well under the constraints of delay, broadcasts, control overhead and it is reliable for scalable networks. presented Preferred and Contention Based Forwarding (PCBF). The efficient geometric broadcast protocol and uses a combination of selecting preferred forwarding and contention-based forwarding. Simulation results show that the PCBF protocol performs better than the other protocols in terms of re-broadcast and end-to-end delay.

George Mastorakis et al. [5] proposed a routing protocol that uses an assigning mechanism and a capacity-aware scheme for energy efficient data flow among nodes with heterogeneous radio spectrum availability in ad-hoc cognitive radio networks. The proposed assigning mechanism can effectively determine the efficient routing paths in a distributed networking architecture. It offers routing using optimal, high throughput data transfer by efficiently selecting the best routing paths. Authors introduced a Backward Traffic Difference (BTD) estimation methodology for energy conservation and capacity aware routing scheme. Simulation results show that the proposed routing protocol can minimize the energy consumption, delay and maximize the resources utilization in ad-hoc

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cognitive radio networks.

Yali Wang et al. [6] proposed a On-demand Routing with Coordinates Awareness scheme for the dissemination of RREQ in MANETs. Chose the transmission of nodes for every single node in ORCA is completed by calculate the shortest Euclidean Distance from all neighbors of the node to four polar points located in the transmission range of the node. They proved that ORCA guarantees the coverage of all nodes in a MANET, or the number of relays for each node. ORCA related with these protocols AODV, OLSR, LAR, and THP. The simulation results show that ORCA can perform by maintaining the minimum routing load, average delays and packet delivery ratios as compared with other routing protocols.

[] proposed a capacity-aware routing protocol for efficient data flow and energy conservation along with heterogeneous radio spectrums in ad-hoc cognitive radio networks. It can maintain optimal, high throughput data transfer by selecting best routing paths. Simulation results show its energy efficiency with the maximum resources utilization and with the minimum routing delays in ad-hoc cognitive radio networks focused on flooding and link states and introduced a Coordinates Awareness routing method that selects relaying nodes using shortest Euclidean Distance from all neighbors of the node to four polar points located in the transmission range of the node. It is compared with AODV, OLSR, LAR, and THP and results show its performance in terms of average delay and packet delivery ratio etc

Youngchol Choi et al. [7] proposed GODV for MMANet which can reduce routing overhead. The routing overhead of the proposed GAODV compared to the original AODV and results. focused on overheads due to the flooding of route requests multi-hop ad-hoc network (MMANet). They proposed a geographical AODV (GAODV) protocol which uses selective broadcast of RREQ using position information and its routing overhead-is less than AODV.

Results show that overhead can be decreased by using node's position. GAODV uses a selective broadcast of RREQ using information of location. The routing overhead-traffic of the GAODV is lesser than the AODV and it can continually decrease as the density of ship increases.

Abu Hasnat et al. [8] explored the impact of scalability over the performance of Geographical Routing Protocol (GRP). Experimental results demonstrate that for a fixed size network area, the GRP protocol show fairly lower delay than AODV protocol. However represent the opposite features for throughput and load as compared with AODV. They focused on the impact of node's density variation on the performance of Geographical Routing Protocol over MANETs. Results show that a static mass network area with varying network density, the GRP routing protocol has small delay time rather than AODV routing protocol. Although it describes opposite characteristics for throughput and load as compared to the AODV, But no routing protocol define finest performance availability in MANET.

Tseng-Yi Chen [9] proposed two energy efficient routing algorithms, called EEGRA, which consider all three factors that affect the power consumption of routing: routing distance, interferences, and computational cost. The basic routing of EEGRA is driven by geographic routing algorithms, and the power term is added to the objective function and constraints for those two algorithms respectively. Results show the EEGRA algorithm uses similar time as the geographic routing algorithms, and can also achieve similar power savings as the optimal SINRbased routing algorithm. In addition, it has better route ability comparing with the I2MR algorithm. focused on power consumption of the communication in multi-hop WSN due to various factors such as routing distance, signal interference, and computation cost of routing etc and proposed energy efficient geographic routing algorithms (EEGRA) for these factors. They compared it with GOAFR+, Face Routing, GPSR, and RandHT algorithms and results show its efficiency of energy consumption.

III. CONCLUSION

In this paper, we discussed the various solutions developed by the researches for Qos enabled, resource aware (i.e. energy, capacity, bandwidth, Coordinates etc.) geographical routing over ad hoc networks. They considered the importance of these factors and their impact over the performance of the ad hoc networks. Researchers have developed unique solutions for specific issues but no one provided a single solution for overall issues. If any researcher explored the QoS provisioning over geo routing then he did not considered the resource awareness and vice versa. This survey shows the requirements of a scheme which can work as a single solution for all the issues related to geographical routing over ad hoc networks.

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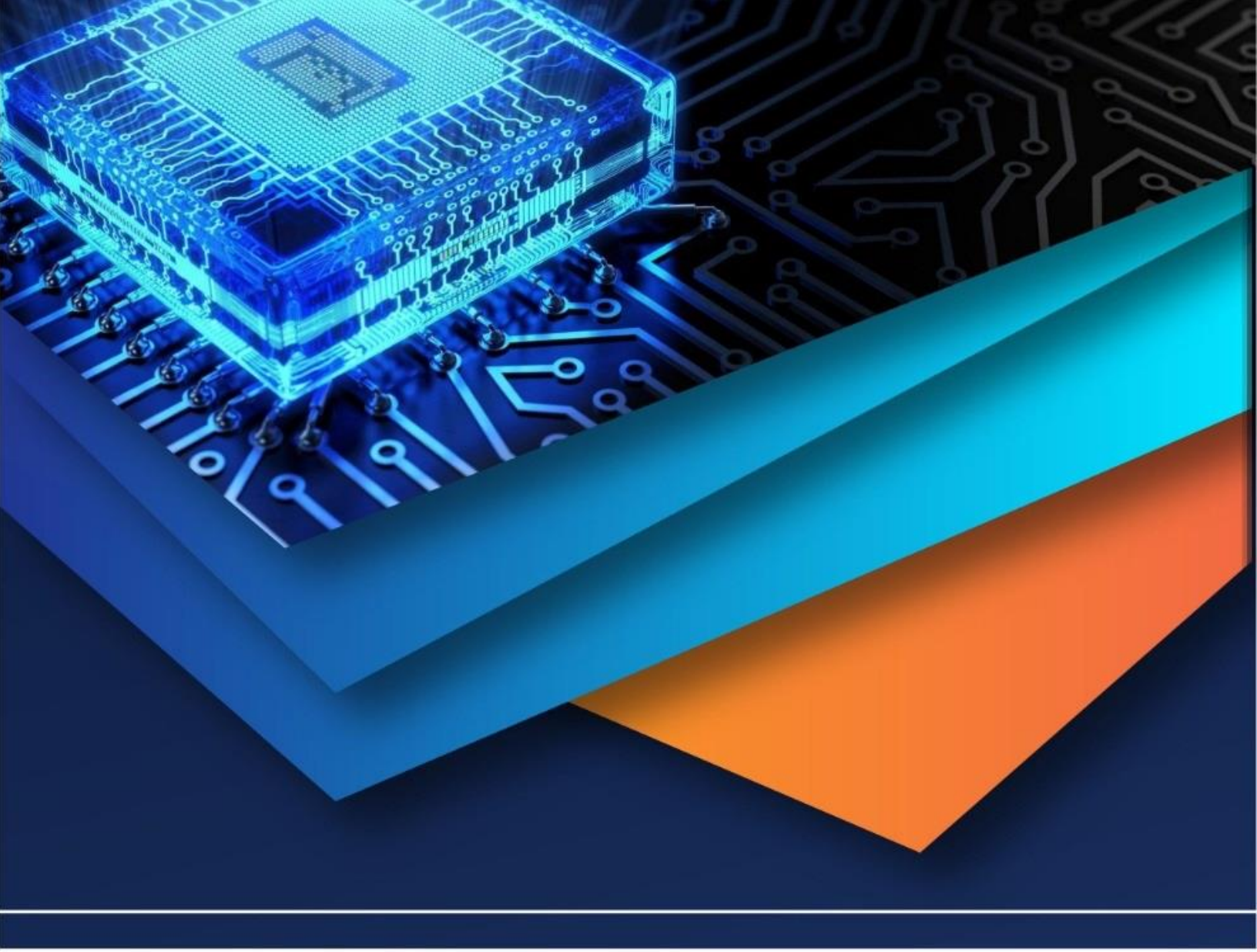

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