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A Closure Looks to Load Balanced Routing Protocol in Ad-Hoc Network

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Abstract
A wireless Mobile Ad hoc Network (MANET) is an mobile network which is infrastructure-less &based on radio to radio multi-hoping and it has nora fixed router centralized controller. All node sare enabled to move so they can get connected dynamically in an arbitrary manner. MANETs is a challenging task due to the dynamic nature of network topology, frequent mobility, band width limitation, limited battery power. For the proper functionality of Ad hoc networks, routing protocols are mandatory. A routing protocol should be able to distribute the routing asks fairly among mobile hosts in MANETS. Most current routing protocols for mobile Ad hoc networks take into account the shortest path with minimum hop count as best route with none thought of any explicit node's traffic and so degrading the performance by inflicting serious issues in mobile node like queuing delay, power depletion and congestion. Therefore it is very lucrative to investigate Routing protocols which use a Routing Metric to Balance Load in Ad hoc networks. In this paper we present various load Balanced Routing protocols for efficient data transmission in MANETs.
Keywords: *Load Balancing, Mobile Ad hoc Networks (MANETs), Routing.*

INTRODUCTION

A critical challenge in the design of Ad hoc networks is the development of efficient routing protocols that provide high quality communication. The nodes in MANET have limited communication resources such as band width, buffer space, battery power etc. Resource constraints in MANET require the traffic to be properly distributed among the mobile host [1].

A routing protocol in MANET should fairly distribute her outing tasks among the mobile host. A nun balanced assignment of data traffic will lead to power depletion non heavily loaded hosts. With more hosts powered down, the connectivity of the network will be reduced which will lead to call failures due to network partitions. In addition, the nodes with heavy routing duties likely have large queuing delay and high packet loss ratio. Therefore, the end-to-end delay and packet loss ratio are large for the connections using those nodes. Thus load balancing is emerging as a key tool to better use MANET resources and improves MANET performance. With Load Balancing, MANET can minimize traffic congestion and load unbalance, as a result, end-to-end packet delay can be minimized, mobile nodes life time can be maximized and network energy consumption can be balanced [2].

Currently, Ad hoc routing protocols lack load-balancing capabilities. In fact, a major drawback of all existing ad hoc routing protocols is that they consider the path with minimum number of hops as optimal path to any given destination. However, this strategy does not have provision for conveying the load and quality of path during out setup. Since, the fewer inner most nodes become the back bone for most for the traffic, leading to congestion

at medium access control layer (MAC) in these nodes. This may in turn lead to high packet delays [3], since some nodes may carry excessive loads. This problem is further aggravated by the use of route cache in some of the protocols. This may resulting a high probability of packet drops due to congestion severely affecting the TCP performance. The heavily loaded nodes area l so likely to in cur high power consumption. This is clear lyanun desirable situation, as it reduces battery power. Hence they cannot balance the load on the different routes thus degrading the performance by causing serious problems in mobile node like congestion, power depletion and queuing delay.

In this paper various novel Load Balancing Protocol are discussed. This paper is organized as follows. In section 2, the characteristics of Ad hoc networks and existing outing protocols are described. Section 3 provides considerable insight to various Load Balancing routing protocols.

BACKGROUND

De-jin Kong et.al [2]In this paper proposed a multipath routing protocol PL_AOMDV with power controlling and load balancing based on AOMDV. In order to implement load balancing and prolong network lifetime, it allocates traffic bandwidth based on node remaining power and load status along the path. Appropriate power is used to transmit data packets. As Ad hoc network is complicated and changeable, the proposed protocol conducts periodical routing maintenance to adjust bandwidth allocation of traffic in time. Simulation experiment results show that the improved PL_AOMDV protocol achieves better performance in the aspects of load balancing and average node lifetime.

The authors Yin and Lin propose a multi-path load-balancing mechanism named as MALB. MALB iteratively regulates the traffic rate on each discovered route. Regulating traffic rate is used to minimize the average end-to-end delay of the network [1]. A similar mechanism is proposed in [2] for multi-path source-routing protocols. In [3], Wu and Harms described a connection between two node-disjoint paths as the number of links between nodes on the separate paths. The results shown in [3] exhibit a hypothesis that as the correlation increases, the end-to-end delays along both numbers of routes increases. For decreasing the end-to-end delay a routing protocol that balances traffic across the least-correlated paths is proposed in [3].

In single-path approaches, however, only a path is established between a source–destination pair of nodes. Several uni-path load balancing mechanisms have been proposed, like different routing metrics as in [4], packet caching as in [5], directional antennas as in [6], etc. The authors Zhu and Hassanein [7] presented a novel routing protocol called LBAR. LBAR contains routing metric takes into account the degree of nodal activity, being the number of active paths through the node. In [8] Lee and Riley proposed that overloaded nodes would be given the freedom to forbid additional communications to set up through them unless their overloaded status is dissolved. Hence, each mobile node present in the ad hoc networks maintains a threshold value as a criterion for decision of whether or not to respond to RREQ messages. Some other papers provided a performance comparison between single-path and multi-path load-balancing approaches. In essence, though multi-path approaches offers numerous advantages as increasing reliability and fault tolerance [9], it appears that single-path approaches are much more efficient when it comes to load-balancing.

In [9], Pearlman et al. demonstrated that multi-path routing mechanism is effective when the alternate paths are disjoint, which is not easy to achieve in mobile ad hoc networks [9,10]. In [12] the authors evaluated the performance of reactive shortest path and multi-path routing mechanism with load balance. Besides, Ganjali and Keshavarzian show that in any ad hoc network with a huge number of nodes multi- path routing can balance the load

significantly better than single-path routing only if a very large number of paths is used between any source–destination pair of nodes, typically a 100 paths per node pair in a 500-node network [11]. The authors of [13] proposed load balancing algorithm which takes into consideration of several realistic parameters such as processing and battery powers of each node, and communication cost for the loads being transferred between the overloaded and under loaded nodes.

Problem formulation:

Existing System

The Existing work has been done over AOMDV protocol to bring out a multi-path routing protocol PL_AOMDV with power controlling and load balancing. It established multiple node disjoint paths between source node and destination node to implement parallel data transmission. The protocol allocates bandwidth according to residual energy and load bottleneck so that path load and residual energy balanced roughly, so as to reduce probability of failure caused by node energy exhausted and prolong overall connectivity. As Ad hoc is complex and volatile, the established path may shift to region with poor bandwidth resources and node bottleneck may change, PL_AOMDV adds periodic routing maintenance to adjust bandwidth allocation in real-time. In addition, PL_AOMDV protocol transmits data packets with appropriate energy in case of data transmission to avoid using maximum power and save node energy.

Proposed work

Though the existing work has been done significantly improve the performance of AOMDV in term of Node balancing and fault tolerance but it degrade the performance of AOMDV in terms of Network overhead so in the proposed work we will improve the performance of the routing protocol in terms of Network overhead as well as further improve the performance of routing protocol for Fault tolerance and load balancing.

RELATED PROTOCOLS

Routing protocols are classified into three different categories:

Reactive protocols: Reactive protocols seek to set up routes on-demand. If a node wants to initiate communication with a node to which it has no route, the routing protocol will try to establish such a route. These routing protocols are AODV, DSR and TORA.

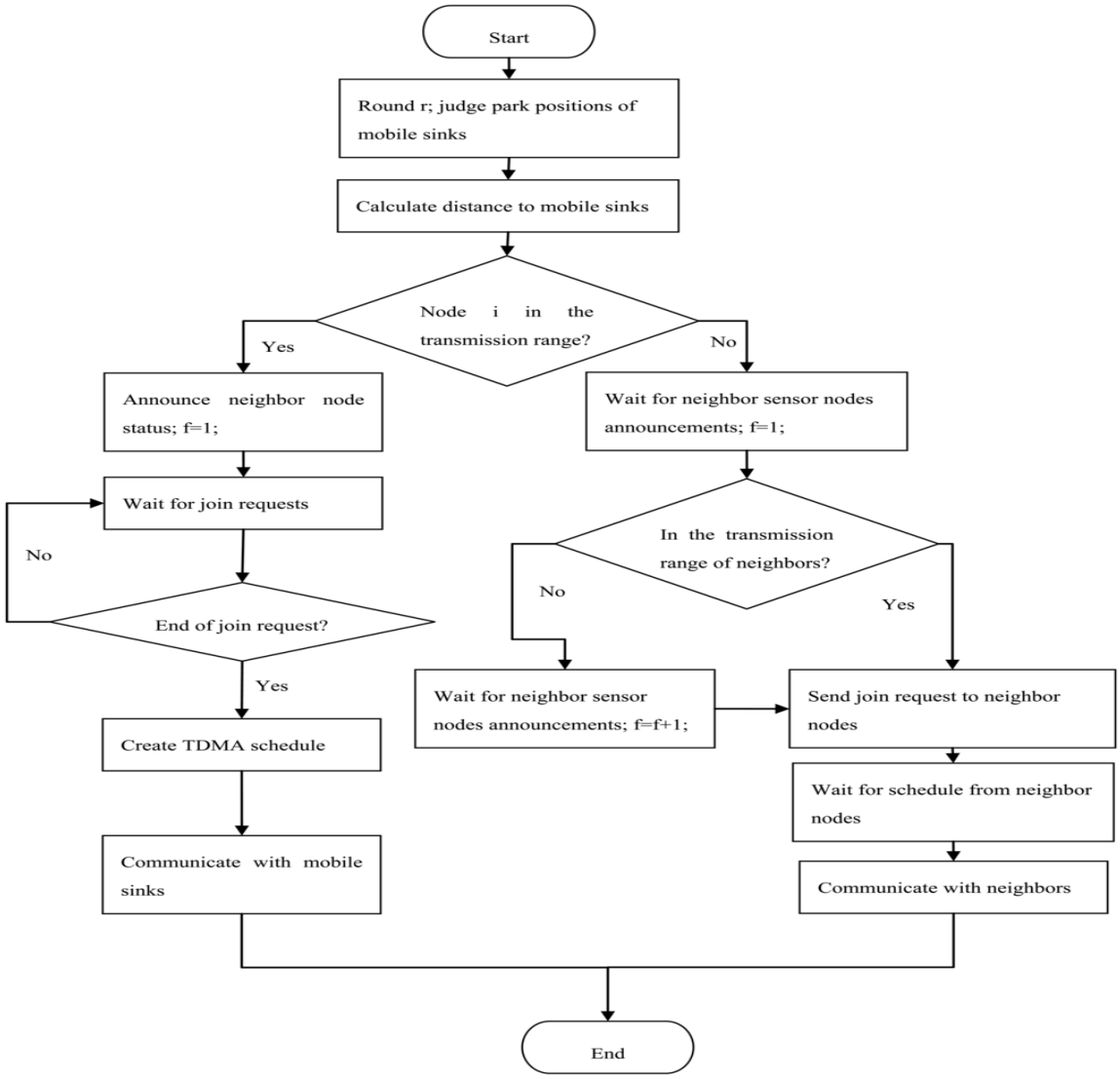
Proactive protocols: The proactive protocols are appropriate for less number of nodes in networks, as they need to update node entries for each and every node in the routing table of every node. It results more Routing overhead problem. There is consumption of more bandwidth in routing table.

Example of Proactive Routing Protocol is Destination Sequenced Distance Vector (DSDV)

METHODOLOGY

In this research a protocol is to be developed using which scalability, include the congestion control, improved load balancing mechanism of the routing protocols. The plan may be defined as follows:

- In the first step an Ad hoc Network is to be deployed. After the development of Ad hoc Network all the processes can be applied to Ad hoc Network.
- When the Ad hoc Network implemented a method will be defined in the network with which the load balancing can be held in it
- After the load balancing improvement the average node lifetime will be increased.
- After increasing average node lifetime, the congestion control in the routing protocol will be included.



WORK FLOW CHART

NS2 SIMULATOR

It is a discreet event simulator targeted at networking research and provides substantial support for simulation of routing, multicast protocols and IP protocols, such as UDP, TCP, RTP and SRM over wired and wireless (local and satellite) networks. It has many advantages that make it a useful tool, such as support for multiple protocols and the capability of graphically detailing network traffic. Additionally, NS2 supports several algorithms in routing and queuing. LAN routing. and broadcasts are part of routing algorithms.

CONCLUSION AND FUTURE WORK

Load balancing is one of the key areas pertaining to research in the field of mobile ad hoc networks. This paper presented various load balancing approaches and researches in design and development of routing protocols for mobile ad hoc networks. The conventional routing protocols are not discussed much since several papers has been published through surveys and performance analysis. The findings of the survey are also presented. In future, load balancing algorithm with enhancement for ad-hoc networks will be implemented, and results with different load balancing routing protocols will be further analyzed.

REFERENCES

1. Younis, Ossama, and Sonia Fahmy. "HEED: a hybrid, energy-efficient, distributed clustering approach for ad hoc sensor networks." *Mobile Computing, IEEE Transactions on* 3.4 (2004): 366-379.
2. Kong, De-jin, and Xiao-ling Yao. "An Ad Hoc Network Load Balancing Energy-Efficient Multipath Routing Protocol." *Journal of Software* 9.1 (2014): 246-250.
3. Tiwari, Vivek Kumar, and KavitaUpadhyay. "energy efficient multipath routing protocol for mobile sensor network."*energy* 1.7 (2013).
4. Jayanthi, Mrs P., and P. G. Scholar. "a survey on energy efficient multipath routing in wireless sensor network." (2014).
5. Umashankar, Behra Rajesh. "A Comparative Study of Delay, Traffic and Hybrid Based Load Balancing Routing Protocols in Mobile Ad Hoc Networks."*International Journal* 2.4 (14).
6. Mishra, Neha, and Ajay Kumar. "Comparative Analysis: Energy Efficient Multipath Routing in Wireless Sensor Network." (2014).
7. Xavier, Alphonsa, and R. N. Gaur. "A Survey on Energy Efficient Dynamic Source Routing Protocol for Manets." *energy* 3.11 (2014).
8. Gupta, Ruchi, et al. "A Research Paper on Comparison between Energy Efficient Routing Protocol with Energy and Location in MANET." *IOSRJCE* 8727 (2013): 70-75.
9. Devi, P. Rama, and Dr D. SrinivasaRao. "Congestion Adaptive Hybrid Multi-path Routing Protocol for Load Balancing in Mobile Ad Hoc Networks."*International Journal of Computer Science and Telecommunications* 3.12 (2012): 2345-4356.
10. Sharma, Naveen, and AnandNayyar. "A Comprehensive Review of Cluster Based Energy Efficient Routing Protocols for Wireless Sensor Networks."*International Journal of Application or Innovation in Engineering & Management (IJAIEM)* 3.1 (2014).
11. Mishra, MrVarun, and MrGajendraSonker. "Energy Aware and Multipath base Reliable Communication in MANET." *Energy* 1.5 (2013).
12. Dhawan, Rajeev, and Swati Singhal. "1. Implementation of a Unique Light Weight Time Stamp Based Security Protocol for Wireless AdhocNetwork."*Issues* 1.1 (2014).
13. Donadkar, Pallavi S., and R. B. Singh. "Energy-Efficient Topology Control with Selective Diversity in Cooperative Wireless Ad Hoc Networks: An Overview."*Energy* 2.12 (2014).
14. Agrawal, Sujata, K. D. Kulat, and M. B. Daigavane. "Evaluation of Routing Algorithm for Ad-hoc and Wireless Sensor Network Protocol." (2013).