ISSN (ONLINE): 2395-695X
ISSN (PRINT): 2395-695X

International Journal of Advanced Research in Basic Engineering Sciences and Technology (IJARBEST)
Volume 2, Special Issue 19, October 2016

Packet Routing Using Optimal Flooding In Cluster Based Mobile Ad-Hoc Network

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Abstract- **Flooding gives extensive regulation and location discovery functionality for a number of unicast and multicast protocols in Mobile Ad Hoc Networks. Seeing its expansive usage as a building block for other network layer protocols, the flooding technique must distribute a packet from one node to all other network nodes using as few messages as possible. In this work, the Optimized Flooding Protocol (OFP) has been proposed. OFP rescues the powerful quantity of wireless bandwidth and incurs lesser overhead. To display the efficiency of OFP, simulation output is shown. Further, OFP is scalable with respect to density; in fact OFP requires smaller amount of communication at larger densities. OFP is also flexible to communication errors.**

Keyword ***-Flooding protocols, Location discovery, Ad-hoc routing protocols, wireless network, OFP.***

I. INTRODUCTION

Mobile ad-hoc network is a self-configuring infrastructure-less network of mobile devices linked by wireless. It is a group of wireless mobile computers in which nodes cooperate by forwarding packets for each other to allow them to communicate outside range of straight wireless transmission. It is a fast movable and independent network. Nodes are free to progress and established self-governing. So, the network topology alters regularly. In mobile ad-hoc network, devices are called as nodes, which have limited transmission range. Flooding or Network huge transmission is the technique in which one node sends a packet to all other nodes in the network. Abundant operation as well as different unicast routing protocols such as Dynamic Source Routing (DSR), Ad Hoc on Demand Distance Vector (AODV), Zone Routing Protocol (ZRP), and Location Aided Routing (LAR) use broadcasting or a derivation of it. The main usage of flooding in all those protocols is for Location Discovery and for establishing routes.

A genuine method for transmission is blind flooding, in which each node will be required to rebroadcast the packet at any time it gains the packet for the first time. Blind flooding will generate many redundant transmissions, which will generate a huge severe transmission storm problem [3]. Given the expensive and limited nature of wireless resources such as bandwidth and battery power, reducing the regulation message overhead for route discovery is a high priority in protocol design. Many of the researchers have proposed major efficient broadcasting techniques. Centralized broadcasting patterns are conferred in [4, 5, and 6]. Techniques in [7] utilize neighbourhood information to reduce redundant messages.

This paper discovers a new protocol to reduce the amount of transmissions needed for broadcasting by doing selective promoting, where only an extensive preferred node in the network do the broadcasting. The major benefit of the protocol is: a) With OFP the number of transmissions required decreases as the density of the network increment; b) OFP reduce the amount of unwanted communication and outperforms other variations of flooding; c) In OFP, a node does not want to recognize locations/addresses of all its neighbors and hence OFP does not impose any bandwidth overhead such as hello messages; d) Behaviors of OFP in large networks has been presented and it is shown that OFP performs well even in very large networks. OFP can also be used as an efficient broadcast protocol for Sensor Networks that operate in adverse conditions.

II. LITERATUREREVIEW

Network-extensive communication is a necessary feature for ad hoc networks. The easiest approach for communication service is flooding. Its benefits are its simplicity and reachability. Whenever, for a single broadcast, flooding generates abundant retransmissions happen in battery bandwidth and power waste. Also, the retransmissions of close nodes are likely to happen at the common time. The output, flooding immediately takes to message collisions and channel contention. This is familiar as the communication storm issue [4].

The communication issue has been widely considered for multi-hop networks. Optimal solutions to compute Minimum Connected

Domination Set (MCDS) [9] were acquired for the case when each node knows the topology of the entire network (centralized broadcast). In specific, many results have been presented in which the broadcast time complexity is examined in detail. From the result proved in [8], this protocol is excellent for networks with fixed diameter. For networks with a larger diameter, a protocol by Gaber et al. [9] completes the broadcast within O(D+log5 n) time slots, and it is optimal for networks with D Є Ω(log5 n). These answers are deterministic and promise a bounded delay on message delivery, but the requirement that each node should require the whole network topology is a powerful state, impractical to maintain in ad hoc mobile environments.

Certain communication protocols that do not need the ability of the entire network topology have been proposed. In a counter-based scheme [4], a node does not retransfer if it overhears the same message from its neighbors for more than a secure amount of times and in a distance-based scheme [4], a node discards its retransmission if it overhears an acquaintance within an interval threshold retransmitting the same message.

The Scalable Broadcast Algorithm requires that all nodes have knowledge of their neighbors within a two-hop radius. This neighbor knowledge coupled with the identity of the node from which a packet is received allows a receiving node to determine if it would reach additional nodes by re-broadcasting. Two-hop neighbor knowledge is achievable via periodic hello messages; each hello messages contains the nodes identifier (IP address) and the list of known neighbors. After a node receives a hello messages from all its neighbors, it has two-hop topology information centred at itself.

The drawback of the above Neighbor Knowledge methods, which use local information to determine whether to rebroadcast, is their difficulty in mobile environments. Out-dated 2-hop neighbor knowledge corrupts the determination of next-hop rebroadcasting nodes. It should also be noted that conclusions in were based on simulations on a network of area 3.5R X 3.5R, R being the range of the nodes. This implies that, in protocols based on 2-hop neighbor knowledge, nodes at the centre of the network knows about92% of the network topology; thus they can fairly approximate Minimum Connected Domination Set.

DSDV routing has been proposed as an approach for routing between ad hoc mobile nodes. The approach involves all nodes, to maintain a complete list of routes to all other nodes in the network. Keeping a routing table does not reduce the route latency before transmission of the first packet to the destination.

In Gossip-based routing [3], a node probabilistically forwards a packet so as to control the spreading of the packet through the network; the probability typically being around 0.65. Though, this simple mechanism reduces the number of redundant transmissions, it does not come close to the minimum transmissions achieved by centralized protocols and hence there is a lot of scope for further improvement.

In this paper we propose a new protocol, which needs minimal neighbourhood information; neither the neighboring node addresses nor their locations are needed. This drastically reduces the effect of the mobility and also no hello messages are needed. Another property of OFP as illustrated through simulations is that the number of retransmitting nodes decreases as the number of nodes in the network increases. OFP is able to deliver a broadcast packet to large fraction of nodes even in highly mobile environments and in presence of transmission errors. OFP is resilient to transmission errors and radio propagation impairments.

III. EXISTING SYSTEM

In MANET, it is important to maintain bandwidth efficiency while maintaining requirements on energy consumption, delay. Foruniform load distribution, co-ordinated channel access protocol is well suited for highly loaded MANET and it is not suited fornon-uniform load distribution due to lack of on-demand dynamic channel allocation. So in order to improve the performance,dynamic channel allocation and co-operative load balancing algorithm are used.

A. *Dynamic Channel Allocation Using Spectrum Sensing:*

The channel coordinator continuously monitors all the channels available in the network and it will rate the availability of the channel in descending order.If the load on the channel increases, then the channel coordinator starts using the additional channel from the other neighboring channel, its transmission increases the power level of that channel. Thus making it available to the other channel coordinators, this increases the power of bandwidth. CA mechanism reacts to the increasing network load and increases the share of bandwidth between the channel coordinators. This reactive response increases the interference in the whole system.

B. *Cooperative Load Balancing Algorithm* :

In order to overcome the problem of interference in DCA, Cooperative load balancing algorithm (CLBA), is proposed. In this the active nodes continuously monitor the power level of all the channel coordinators. When the load on the channel coordinator increases, the active nodes switch from the heavily loaded channel to the one with fewer resources. The resources vacated by the nodes that switches from highly loaded channels, to the low loaded ones , is made available to the other nodes that do not have channel access to any other channel coordinator. Hence, this will increase the total number of nodes, that access to the channel, increasing the service rate and throughput.As shown in figure I, the Nodes A to G are the source nodes and try to contend for the channel access from one of the cluster heads [CHs]. Each CH has the fixed number of channels;the scenario for CLBA is shown below:

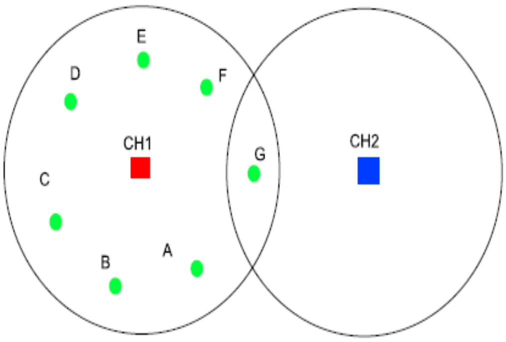

Figure 1 : Scenario for cooperative load balancing algorithm

If the accessibility of the channel goes in alphabetical order, then Node G would demand and mark for the CH1 and then 'F' and so on. CH1 makes the availability of the channel based on the nodes demand. As the load on the CH1 increases it starts using the additional channel from CH2.The situation comes in which the nodes surrounding "CH2" may also try to access the channel from CH2 and hence the interference occurs. Therefore, CLBA is applied in which the active nodes continuously monitors the load of the cluster head and try to switch from heavily loaded CH to the one with available resources.

IV. MH-TRACE:

Multi-Hop Time Reservation using Adaptive Control for Energy Efficiency. A distributed MAC protocol for energy efficient real-time packet broadcasting in a multi-hop radio network, here, the network is partitioned in to overlapping clusters through a distributed algorithm, which needs very little control overhead. Time is organized into cyclic constants. Each cluster head chooses the least noisy frame to operate according to the interference level of the dynamic network. Collisions with the members of other clusters are minimized, by the clusterheads's selection of the minimal interference frame. Ordinary nodes are not static members of clusters, but they choose the cluster, based on the availability of data slots within the corresponding clusters. Each node that is scheduled to transmit data ends a short information summarization [IS] packet prior to actual data transmission. Through, which the neighbor nodes decide whether to stay awake and receive the data packets.

Advantages of MH-TRACE:

- Energy efficient due to the use of TDMA and IS slots.
- Allows nodes to enter the sleep mode often.
- Higher throughput due to the coordinated channel access.
- Support for real-time operation, due to its time-frame based cyclic operation.

V. PROPOSED SYSTEM :

Flooding achieves the goal of location discovery by letting all the nodes that receive the message, retransmit it again. The intuition behind our protocol is that in order to attain the aim, there is no want for all nodes to transmit/retransmit the message. Instead, the goal can be achieved by allowing some strategically preferred nodes to retransmit the message.

An optimal flooding algorithm, through which the data is sent from Source – Destination, in an optimized manner, is proposed. The protocol is used for the route/ location discovery, where the control overhead is minimized by doing selective forwarding, which broadcasts only a few selected nodes in the network. It is assumed that with respect to other nodes in the range of communication, the mobile nodes can discern their relative positions. This can be easily achieved by GPS devices. The covering problem, which deals with covering a region completely using minimum number of circles, is used for this purpose. The new challenge in energy consumption and the researcher's attention was demanded by the mobility of nodes. Some real applications demands a complete mobile sensor network, while others impose combined environments of fixed and mobile sensor nodes in the same network. The main challenge in Mobile Ad-Hoc Network is the packet loss that occurs due to the mobility of nodes, in parallel with the energy consumption.

VI. CONCLUSION

Building efficient broadcast protocols for ad hoc networks is challenging due to the dynamic nature of the nodes. In this paper an Optimized Flooding Protocol (OFP), a novel protocol for broadcasting, has been proposed. The protocol is based on a variation of the Covering Problem. OFP is performed in an asynchronous and distributed manner by each node in the network.OFP has a number of advantages over other approaches considered in the literature. The best feature of OFP is that a node needs only minimal local information to make a propagation decision and hence, OFP does not impose any bandwidth overhead in terms of hello messages. The efficiency of OFP remains very high even in large networks and OFP scales with density. Its efficiency in mobile networks and its robustness even in presence of transmission errors make it an ideal choice for MANETs and sensor networks.

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