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Load Balancing and Dynamic Channel Allocation under Manet

L. Ajay Krishna, V. Aswin, D. Gladwin Henald, P Nathiya Devi
Department of Computer Science and Engineering, Dhanalakshmi College of Engineering, Chennai, Tamilnadu, India

ABSTRACT

Mobile ad hoc networks (MANETs) are getting increasingly common, and typical network loads considered for MANETs are incrementing as applications progress. This, in turn, increases the importance of bandwidth efficiency while maintaining close needs on energy consumption, delay and nervousness. Coordinated channel access protocols have been shown to be befitted for highly loaded MANETs under immutable load distributions. However, these protocols are in general not as befitted for eccentric load distributions as uncoordinated channel access protocols due to the lack of on-demand dynamic channel allocation mechanisms that subsist in framework based coordinated protocols. In this paper, we present a lightweight dynamic channel allocation working and a cooperative load balancing strategy that are applicable to cluster based MANETs to direct this issue. We disclose protocols that utilize these mechanisms to improve performance in terms of output, energy utilization and inter-packet delay variation (IPDV). Through extensive simulations we show that dynamic channel allocation and cooperative load balancing refine the bandwidth efficiency under non-uniform load distributions correlated to protocols that do not use these mechanisms as well as compared to the IEEE 802.15.4 protocol among GTS mechanism and the IEEE 802.11 uncoordinated protocol.

Keywords: Mobile ad hoc networks, bandwidth efficiency, distributed dynamic channel allocation

I. INTRODUCTION

Mobile ad hoc networks (MANETs) have been an essential class of networks, providing communication support in mission critical synopsis including battlefield and skillful goals, search and rescue operations, and disaster relief operations. Group communications has become necessary for many applications in MANETs. The typical number of users of MANETs has continuously incremented, and the applications backed by these networks have become increasingly resource intensive. This, in turn, has incremented the priority of bandwidth efficiency in MANETs. It is crucial for the medium access control (MAC) protocol of a MANET not only to habituate to the dynamic environment but also to efficiently manage bandwidth utilization. In general, MAC protocols for wireless networks can be categorised as coordinated and uncoordinated MAC protocols based on the collaboration stage. In uncoordinated protocols such as IEEE 802:11, nodes contend with each other to share the usual channel. For low network loads, these protocols are bandwidth efficient due to the lack of overhead. However, as the network load increases, their bandwidth efficiency decreases. Also, due to idle listening, these protocols are in general not energy efficient. On the other hand, in coordinated MAC protocols the channel access is regulated. Fixed or dynamically chosen channel controllers figure out how the channel is shared and accessed. IEEE 802.15.3, IEEE 802.15.4, and MH-TRACE are illustrations of such coordinated protocols. Coordinated channel access schemes provide support for quality of service (QoS), reduce energy gratification, and increase throughput for dense networks. Extensively utilized cellular networks also use a coordinated MAC protocol in which the channel access is regulated through fixed base stations.

II. METHODS AND MATERIAL

A. Existing System

A coordinated channel access protocol is appropriate only for loaded MANET under uniform load distributions. It is not appropriated for non-uniform load distributions as uncoordinated channel access protocol due to lack of on demand dynamic channel allocation. Coordinated MAC protocols the channel access is regulated. Uncoordinated protocol nodes contend with each other to fragment a common channel.For low network loads, these protocols are bandwidth efficient due to lack of overhead. However as the network is incremented, their bandwidth efficiency is decremented. Due to idle listening, these protocols naturally are not energy efficient. Coordinated channel access protocol adapt only in static environment.

B. Proposed Scheme

In our proposed project we used to construct a dynamic channel allocation in cooperative load balancing in a cluster based MANET environment. . To provide dynamic channel allocation and cooperative load balancing use DCA-Trace (Dynamic channel Allocation).DCA-TRACE protocol contains three types of slots contention slots, IS slots, data slots. Contention slots are utilized by the nodes to send their channel access request. Data slots are used to all nodes are receiving the data successfully by sending acknowledgement to nodes.

Why we need dynamic channel allocation means, the channel controller continuously examine the power level in all the available channel in network and assess the availability of the channels by comparing the measured power level is below means it access the other channel in the network.

We create Nodes and channel selection process of cluster head, in which channel having high capacity it elected as a cluster head. Using beacon packets we can spot the channel coordinator, after the time expire if you cannot get bacon packet then cluster head is created automatically. To allocate a channel depends on power level. Channel reuse is based on channel capacity cluster head manage stack depends on size. Data can be split in to packet and then send data to destination nodes.

III. RESULTS AND DISCUSSION

A. Experimental Works

a) Network Formation

In network formation, we generate nodes and grouping all nodes. In node creation we have to give distance and range. Based on distance and range the node will be created. Depends on coverage of nodes group is created. If Coverage 0-50 then the node is group-1, coverage 5-100 then the node is group 2. In region each node sends "hello" message to other nodes which allows identifying it. Once a node identifies "hello" message from another node (neighbor), it maintains a contact record to save information about the neighbor. Using multicast socket, all nodes are used to detect the neighbor nodes.

b) Electing cluster head

Each node does not know the group, in which group the node is created. So that we have to intimate the region of respective nodes. After that the cluster head election process. In MH-TRACE certain nodes assumes the roles of channel coordinator, here called cluster head. All cluster head transfer regular beacon packets to announce their presence to the nodes in their neighbourhood .when a node does not receive a beacon packet from any cluster head for a predefined amount of time, it assumes the role of a channel coordinator.

c) Data transmission

Dynamic channel allocation algorithm the channel manager monitors the power level in all the available channels in the network. If the load on the channel manager is incremented beyond capacity and measured power level is low. then the channel coordinator offer request to other region of channel coordinator, if other region channel coordinator having capacity then using CSMA protocol it will process acknowledgement if cluster head receive the acknowledgement it send nodes. Then we can send data from one node to other nodes within region and also outside the region. Splitting a data in to packet and send other region destination nodes.

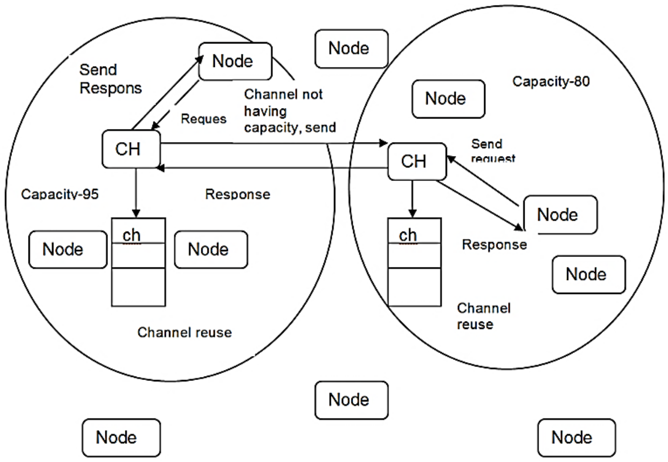

Figure 1: Architecture Diagram

B. Techniques

a) Dynamic Channel Allocation Algorithm:

The first mechanism that we propose is a dynamic channel allocation algorithm similar to the ones that exist in cellular systems. Under non-uniform loads, it is crucial for the MAC protocol to be flexible enough to let additional bandwidth be allotted to the controllers in the heavily loaded region(s). Dynamic channel allocation systems in cellular systems depend on higher bandwidth back-link connections available to cell towers. The cell towers are coordinated using these back-link connections to provide dynamic channel allocation and spatial both to reuse simultaneously. On the other hand, in MANETs, the channel coordinators can only communicate by sharing common channel resources, reducing the resources available for data transmission. In addition to this, the interference relationships between channel coordinators are highly dynamic. Hence, executing a tight coordination would be too costly for a MANET system. Instead, we adopt a dynamic channel borrowing scheme that uses spectrum sensing. In this algorithm, the channel controllers continuously supervises the power level in all the applicable channels in the network and assess the availability of the channels by comparing the measured power levels with a inception. If the load on the channel controller increases beyond capacity, given that the measured power level is less, the channel coordinator starts using an additional channel with the least power level measurement.

b) Cooperative Load Balancing:

The DCA algorithm approaches the problem of non-uniform load distribution from the perspective of the channel coordinators. The same problem can also reached from the perspective of the other nodes in the network. Using cooperative nodes smoothes out mild non-uniformities in the load distribution without the need for the adjustments at the channel coordinator side. The load on the channel coordinators generated from the demands of the ordinary nodes. Many nodes in a network have authorized to more than one channel coordinator. The underlying idea of the cooperative load balancing algorithm is that the active nodes can continuously supervise the load of the channel coordinators and switch from heavily loaded coordinators to that with available resources. These nodes can identify the depletion of the channels at the coordinator and pass their load to the other coordinators with available resources. The resources vacated by the nodes that switch can be utilized for other nodes that do not have access to any other channel coordinators. This increases the total number of nodes that access the channel and hence increments the service rate and the throughput.

c) Dynamic Channel Allocation for TRACE:

In MH-TRACE, each CH performs in one of the frames in the super frame. Since the number of data slots is fixed, the CH can only provide channel access to a finite number of nodes. Due to the dynamic structure of MANETs, one CH may be overloaded while others may not be utilizing their data slots. In that case, although there are unused data slots in the super frame, the overloaded CH would give channel access only to a limited number of nodes, which is equal to the count of data slots per frame, and the CH would decline the channel access requests of the others. Thus, the system requires dynamic channel allocation scheme to give access to a larger number of nodes. Instead of choosing and operating in the least noisy frame as in MH-TRACE, in DCA-TRACE, according to the load level, CHs decide on the number of frames they require and opportunistically select that many frames from the less noisy frames. DCA-TRACE includes two additional mechanisms at the top of MH-TRACE: i) a mechanism to keep track of the barrier level from the other CHs in each frame; and ii) a mechanism to sense the barrier level from the transmitting nodes in each data slot in each frame. These mechanisms make use of existing messages and do not add complications other than slightly increasing memory requirements to store the barrier levels. The MH-TRACE structure provides CHs the strength to measure the interference from other CHs in their own frame and in other frames through listening to the medians in the CA slot of their frame and the Beacon slots of all other frames.

C. Enhancements

Frequency reuse is tightly linked to the bandwidth efficiency. In dynamic behavior of MANETs the traffic load may be highly non uniform over the network area. In MAC layer allowing channel coordinators to utilize channel reuse and adapt to any changes in the traffic distribution. Frequency reuse based on channel capacity. Cluster head maintain stack depends on size. In stack mechanism, maintains frequency and this frequency can be reuse.

IV. CONCLUSION

In this paper, we studied the problem of non-uniform load distribution in mobile ad hoc networks. We proposed a light weight dynamic channel allocation algorithm and a cooperative load balancing algorithm. The dynamic channel allocation works through carrier sensing and does not increase the overhead. It has been shown to be very effective in increasing the service levels as well as the throughput in the system with minimal effect on energy consumption and packet delay variation. The cooperative load balancing algorithm has less impact on the performance compared to the dynamic channel allocation algorithm.. The combined system has been shown to perform at least as well as the systems with each algorithm alone and performs better for many scenarios. Both of the algorithms as well as the combined system also have a fast response time, which is on the order of super frame duration of 25 ms, allowing the system to adjust under changing system load.

V. REFERENCES

[1] B. Karaoglu, T. Numanoglu, and W. Heinzelman, "Analytical performance of soft clustering protocols," Ad Hoc Netw., vol. 9, no. 4, pp. 635–651, Jun. 2011.

[2] Part 15.3: Wireless medium access control (MAC) and physical layer (PHY) specifications for high rate wireless personal area networks (WPAN), IEEE Draft Standard, Draft P802.15.3/D16, Feb. 2003.

[3] Wireless Medium Access Control (MAC) and Phys. Layer (PHY) Specifications for Low-Rate Wireless Personal Area Networks (WPANs), IEEE Standard 802.15.4-2006, Sep. 2006.

[4] B. Tavli, and W. B. Heinzelman, "MH-TRACE: Multi hop time reservation using adaptive control for energy efficiency," IEEE J. Sel. Areas Commun., vol. 22, no. 5, pp. 942–953, Jun. 2004.

[5] M. Kappes, "An experimental performance analysis of {MAC} multicast in 802.11b networks for VOIP traffic," Comput. Commun., vol. 29, no. 8, pp. 938–948, 2006.

[6] B. Leiner, D. Nielson, and F. Tobagi, "Issues in packet radio network design," Proc. IEEE, vol. 75, no. 1, pp. 6–20, Jan. 1987.

[7] I. Cidon and M. Sidi, "Distributed assignment algorithms for multi-hop packet-radio networks," in Proc. 7th Annu. Joint Conf. IEEE Comput. Commun. Soc., Mar. 1988, pp. 1110–1118.

[8] L. Gao, and X. Wang, "A game approach for multi-channel allocation in multi-hop wireless networks," in Proc. 9th ACM Int. Symp. Mobile Ad Hoc Netw. Comput., 2008, pp. 303–312.

[9] M. Felegyhazi, M. Cagalj, S. Bidokhti, and J.-P. Hubaux, "Noncooperative multi-radio channel allocation in wireless networks," in Proc. IEEE 26th Conf. Comput. Commun., May. 2007, pp. 1442–14