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AN IMPROVED MODEL FOR LOAD BALANCING AND DYNAMIC CHANNEL ALLOCATION IN CLUSTER BASED MANETs

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ABSTRACT

In Mobile ad-hoc networks (MANETs), mobile devices are arranged independently for the use of wireless links and progressively fluctuating system topology. In MANETs, the interconnections are dynamically changing in an increasing rate due to fluctuating non-uniform loads which leads to network congestion and data losses. To handle such interconnections, the channel allocating scheme must be done in such a way to support dynamic allocation mechanism and Cooperative load balancing to handle the heavy load in MANETs. Dynamic channel allocation scheme proves more advantageous over all other channel allocation schemes because it controls network traffic effectively, avoids data loss and is energy efficient. This technique also has some problems like intervention and incompetence under heavy load. In this paper Spectrum sensing mechanism is analyzed as a suitable solution for this problem, which senses the free channels and reduces the network interference. Cooperative load balancing control is associated with controlling incoming traffic in a telecommunication network and is extensively used to avoid congestive crumple or link capability of the intermediate nodes and networks and to reduce the rate of sending packet. Through extensive simulations, we illustrate that both dynamic channel allocation – time reservation using adaptive control for energy efficiency (DCA-TRACE) and cooperative load balancing get better bandwidth efficiency under non-uniform load distributions compared to other protocols that do not use these mechanisms. Simulation results prove that DCA-TRACE provides noteworthy improvement for both uniform and non-uniform traffic heaps.

Keywords: mobile ad hoc network, channel allocation schemes, MAC protocols..

1. INTRODUCTION

Mobile Ad Hoc Network (MANET) is a group of one or more connectivity hubs with wireless communications and networking capability that communicate with each other without the help of any centralized administrator and also the wireless terminals that can dynamically form a network to transmit information without using any existing fixed network infrastructure. In order to channelize communication within the network, a routing protocol is employed to establish routes between the hubs. The main purpose of such an ad-hoc network routing protocol is to provide precise and efficient route formation between a pair of nodes so that data may be delivered in a timely fashion. Route construction should be done with a minimum of overhead and bandwidth consumption. A network of mobile nodes using peer-to-peer communication is called an ad- hoc network. The nodes in such networks are limited by power, memory, bandwidth and computational constraints. These networks have the ability to provide economical communication without any permanent infrastructure. Hence, they are very useful in disaster recovery, joint computing, rescue operations and military surveillance. Various routing algorithms and have been designed for this type of networks.

In dynamic channel allocation algorithm, channel administrators react to the increasing localized network load by increasing their share of bandwidth. In spite of providing effective support for non-uniform network loads, the reactive response taken by the channel administrators increases the interference in the entire system. It also provides low latency links with an efficient communication with all the nodes of the network. In Cooperative Load Balancing algorithm, the loads on the channel administrators initiate from the requirement of the ordinary nodes. Many nodes in a network have access to more than one channel administrator. The basic premise of the cooperative load balancing algorithm is that the active hubs can continuously examine the load of the channel administrators and interchange between the heavily loaded administrators to the ones with available resources. These nodes can detect the depletion of the channels at the administrators and shift their load to the other administrators with more available resources. The resources released by the nodes with capability to switch, can be used for other nodes that do not have access to any other channel coordinators. It increases the total number of nodes that access the channel and hence increases the service rate and the throughput.

In this paper we propose the above two algorithms for managing the non-uniform load distribution in MANETs to get better bandwidth efficiency, energy efficient and real time coordinated network allocation protocol. We present the related work done on the subject and illustrate the results of the analysis through extensive simulation techniques in the subsequent section of this paper. We conclude the paper with the validation of the proposed techniques.

2. RELATED WORKS

As a rule, MAC conventions for remote systems can be named composed and clumsy MAC conventions [2] in view of the coordinated effort level. In awkward conventions, for example, IEEE 802.11, hubs fight with one another to share the regular channel. For low system stacks, these conventions are effective in data transmission