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A SURVEY ON MULTIPATH BASED COOPERATIVE LOAD BALANCED PROTOCOL FOR CLUSTER BASED MANET

[1]Gayathri.V, [2]Mr. Sudhakar.K

[1]Gayathri.V, P.G. Scholar, Email: gayu2011.cse@gmail.com
[2]Mr. Sudhakar.K, Assistant Professor, Email:hicetsudhakar@gmail.Com

Abstract: - This project is based on a multipath based routing protocol to collaborate with the MAC layer for load balancing of the network by sending the packets in selected multipath instead of one single path communication. A cross-layer architecture where in the MAC layer and routing layer help in achieving a better load balancing of the network. In this paper we have discussed about the clustering and routing. Related papers are taken survey and its advantage and disadvantages are discussed.

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

1. Introduction

A mobile Ad hoc network is configured themself, the fewer networks of mobile devices connected without wires. Each device is free to move in any direction, and will therefore changes its links to other devices frequently.
This project is implemented by NS2 simulation.NS2 means Network simulator. The Implementation of network protocols are:

1) TCP, UPD
2) Traffic source mechanism: FTP, TELNET, Web
3) Router Queue management mechanism: Drop Tail, RED
4) Routing Algorithm
5) Mac layer protocols for LAN

The Background of the ns Simulator are based on two languages C++, and OTCL. It has a rich library of network and protocol object. The Compiled C++ hierarchy gives efficiency in simulation and faster execution times. The

OTCL network topology is simulated. Ns2 is event simulator depends on the timing of events which are maintained by a scheduler. Event is an object in C++ hierarchy. i.e., unique ID, Scheduled time, pointer to an object. The Scheduler is used to maintain ordered data structure with the events to be executed, invoking the handler of the event. 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 in order to provide dynamic channel allocation and spatial reuse simultaneously. In MANETs, the channel coordinators can only communicate by sharing common channel resources, reducing the resources available for data transmission. Also, the interference relationships between channel coordinators are highly dynamic. Implementing a tight coordination would be too costly for a MANET system.

A dynamic channel that utilizes spectrum sensing. The channel controllers monitor the power and assess with a threshold. The channel coordinator starts using the channel; its transmission increases the power level. As the local network load decreases, controllers that channel, making it available for controllers. The load on the channel coordinators originate from the ordinary nodes. Many nodes in a network have access one channel coordinator the cooperative load balancing algorithm is nodes can monitor the load of the channel coordinators and with available resources. These nodes can detect the depletion of the and shift their load to the other coordinators with more available resources. The resources that switch can be used to channel coordinators. This increases number of nodes that access the channel and increases the service rate and the throughput.

2. Various Techniques

1. "Analytical performance of soft clustering protocols"

The protocol used in the medium access control (MAC) layer is related to a mobile ad hoc network (MANET).The extensive simulation are used to find the best values for the variables. The goal of the medium access control (MAC) protocol is to efficiently utilize the wireless medium.

MAC protocols can be classified as coordinated and non-coordinated. Non-coordinated protocols are used for networks with low data rates. In coordinated access protocols are used for networks where the load is high. The coordinated channel access schemes provide support for QoS, reduce energy dissipation and increase networks.

The drawback is that there is the need for excessive amounts of processing power and time. The effective use of the channel determines the ability of the network such as quality application of service (QoS), energy dissipation, and fairness. Each node is capable of communicating directly with every other node. Many of the parameters in cluster-based protocols are set a-priori based on network conditions specific physical layer. The true relationship between the parameters and the protocol performance can be determined by analysis. For large and dense networks, this approach requires excessive amounts of processing power. we have developed an analytical model that reflects the relationships between the protocol parameters and the protocol under different network conditions for a TDMA-based clustered protocol, MH-TRACE.

We develop a model that relates the TDMA frame parameters and the node density to the expected number of dropped packets and the number of collisions. This model enables to find the set of parameters that maximize the energy efficiency for TDMA-based clustered and MH-TRACE. We use this model to analyze the MHTRACE protocol. The scope of the paper is introduced together with a short description of the MHTRACE protocol. The basics of clustering approaches and their interaction with the other layers of the communication stack. We also provide an overview of the MH-TRACE protocol. In nodes are able to communicate directly with the nodes of other clusters and to choose the cluster from access

2."Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low-Rate Wireless Personal Area Networks (WPANS)"

Wireless personal area networks (WPANs) are used to convey information over short distances. The WPANs connections involve little or no infrastructure. The specific enhancements and corrections include resolving ambiguity, reducing complexity, increasing flexibility, the newly available frequency allocations are considered. The purpose is to extend the market applicability and to remove ambiguities. An Low rate –wireless personal area network (LR-WPAN) is a low-cost communication network that allows wireless and throughput requirements. A coordinator that is capable of replacing the PAN coordinator, if the PAN coordinator leaves the network for reason.

A PAN can have zero or more alternate PAN. The service used to establish membership for a device in a wireless personal area network. A cryptographic function that operates fixed size. A cryptographic function that operates fixed size. The period of time a beacon frame during which devices wishing to transmit for channel access using a slotted carrier sense multiple access with collision avoidance (CSMA-CA) mechanism. A symbol period occurring during the CAP. The transformation of a message into a new representation to recover the original representation. Duration of time where no transceiver activity is scheduled to take place.

A list of the pending transactions, which are to be sent using indirect transmission, that are initiated by the medium access control (MAC) of a given coordinator. The transaction queue is maintained the transactions are in progress, and the length of implementation dependent must be at least one. Two different device types can participate in an network; a full-function device (FFD) and a reduced-function device (RFD). The FFD can operate in three modes as a personal area network (PAN) coordinator, a coordinator, or a device. An FFD can talk to RFDs or other FFDs, An RFD can talk only to an FFD.

An RFD is simple, such as a light switch or a passive infrared sensor and may only associate with a single FFD at a time. The RFD can be implemented using minimal resources and memory capacity. A system conforming to this standard consists of several components. The most basic is the device. A device may be an RFD or an FFD. All devices operating on a network of either topology shall have unique 64- bit addresses. This address are used for direct communication within the PAN, or a short address may be allocated by the PAN coordinator when the device associates and used. The PAN coordinator might often be mains powered, The devices will most likely be battery powered. Applications that benefits include the home automation, personal computer (PC) peripherals, toys and games, and personal health care.

3. “Non-cooperative Multi-radio Channel Allocation in Wireless Networks”

The Wireless networks provide a flexible and cost-efficient method to communicate between different parties. Frequency Division Multiple Access (FDMA) is a technique in which many users can share the communication medium. The principle of FDMA is split up to the available bandwidth is called channels. The non-cooperative behavior of the devices is that their channel allocation will result in a load-balancing solution. Channel allocation was mainly used in the framework of cellular networks. .The problem is multi-radio multi-channel allocation in wireless networks. Channel allocation schemes in cellular networks can be divided into three categories: fixed channel allocation (FCA), dynamic channel allocation (DCA) and hybrid channel allocation (HCA). In a fixed channel allocation scheme, the same numbers of channels are permanently allocated to the base stations. This dynamic property, the DCA can adapt to changing traffic demand. Due to the emergence of alternative communication technologies, channel allocation schemes are becoming a focus of research again. The existence of Nash equilibria in the single collision domain channel allocation game. The definition of NE expresses the resistance to the deviation of a single player. to enable the selfish players to converge to one of these Nash equilibria from an arbitrary initial configuration.

The two algorithms are the following: 1) a centralized algorithm and 2) a distributed. we will extend our current model to include different channel characteristics and payoffs. We will also pursue our theoretical investigations of selfish multi radio channel allocation for general topologies. We will pay particular attention to the application of

existing fairness metrics in the competitive context. We will take the cost of channel scanning into consideration. Last but not least, we will study convergence algorithms that achieve Nash equilibria in general topologies.

4. "Architecture and algorithms for an based multi-channel wireless mesh network"

The multi-channel wireless mesh network (WMN) architecture that used for each mesh network node with multiple network interface cards (NICs). The central design issues of the multi-channel WMN architecture are using channel assignment and routing. It is based multi-hop wireless ad hoc network architecture that manages multiple radio channels simultaneously by equipping each node with multiple NICs.

It is mainly focus on wireless mesh networks (WMNs). A WMN operates like a network of fixed routers, except that they are connected only by wireless links. In this application, some of the nodes in the WMN are connected to the Internet through physical wires that the remaining nodes access the Internet through the wired gateways by forming a multi-hop WMN. Another application of WMN is an enterprise-scale wireless backbone. The bandwidth problem is more serious for multi-hop wireless mesh networks (WMNs) due to interference between successive hops on the same path as well as that between neighboring paths. Such bandwidth aggregation is routinely used in wireless LANs that operate in infrastructure mode, where traffic is distributed among multiple interfaces of an multiple access points.

A WMN is similar in concept to a mobile ad hoc network. First the nodes in a WMN are fixed. Topology changes are infrequent, and occur only node failures, node shut-down for maintenance, or addition of new nodes. Second, the traffic characteristics are aggregated from a large number of traffics, do not change very frequently, permitting optimization of network based on measured traffic problems. Third, the traffic distribution in a WMN is skewed; most of the user traffic is directed to/from a wired network. This happens because users want to access resources on the Internet or on the enterprise servers, and both of them most likely reside on the wired infrastructure. Finally, to serve as an effective backbone, a WMN requires the paths to reduce packet delays. Multi-NIC approach has been mentioned in the past, we believe this work represents the study of this approach in the context of a wireless access network.

The following research contributions:

- A fully distributed channel assignment algorithm that can adapt to traffic loads,
- A multiple spanning tree-based on load-balancing routing algorithm that can adapt to traffic load changes as well as network failures, and
- A comprehensive performance study that shows significant bandwidth improvements over single-channel WMNs are validated through the measurements on a fully working prototype. Single-channel WMNs cannot adequately support the bandwidth requirements of last-mile wireless broadband access networks.

5. "Mitigating the exposed Node problem in ad hoc networks"

The Distributed Coordination Function (DCF) of MAC Protocol is used to enable the nodes to identify itself as exposed nodes and to schedule concurrent transmissions by improving utilization and mitigating the exposed node problem. It makes the minimal changes in the MAC protocol using simulations in GloMoSim, that it provides significant improvement in throughput. The DCF protocol requires that the sender and receiver are interchanged several times between pairs of communicating nodes, so neighbour nodes should be silent during the entire exchange. It does not require the changes in frame formats or the introduction of new frame types. but the methodology to implement it within the Distributed Coordination Function.

We propose minimal changes to the DCF MAC protocol to enable exposed nodes to transmit and the opportunity presents itself. Such a node can initiate a parallel transmission by simply aligning the DATA transmission with the

transmission, without invoking the RTS/CTS exchange. The key feature of MACA-P is introduces a control gap between the RTS/CTS exchange and the subsequent DATA/ACK exchange of the first pair of communicating nodes. This control gap of nodes to complete their own RTS/CTS to exchange and to align their data transfer with the DATA and ACK packets of the first pair. To achieve this alignment, the RTS/CTS packets must be extended. The RTS packet is also enhanced to carry a bit called the inflexible bit, which indicates the proposed transmission schedule can be changed by the node that receives the RTS.

If an ACK is received then the secondary transmission is successful. If an ACK is not received, then to make a secondary transmission has failed and the node must return to normal and send the data as per standard. It will pretend that the transmission never took place and return the DATA packet for normal handling as per the standard. Each node also maintains a counter. The EXPOSED_ FAILED_ COUNTER which keeps the count of the number of secondary transmissions that failed. A potential exposed node cannot check whether it has started receiving DATA from the RTS sender. MAC protocol which allow concurrent transmission to occur whenever possible, reducing the loss in throughput due to the exposed node problem. While it has long been recognized that exposed nodes should be free to transmit, we have presented an explicit algorithm within the framework. It makes use of the observed fact that traffic on the Internet has a large number of small packets, and the accepted fact that it is inefficient to use RTS/CTS for such small packets.

6. "Multichannel CSMA with signal power based channel selection for multi hop wireless networks"

The multiple channels and a distributed channel selection scheme are used for multi hop wireless networks by producing a new carrier–sense multiple access (CSMA) protocol The protocol divides the available bandwidth into N channels where the transmitting station selects an channel for packet transmission. The selection criterion is based on the interference power measurements on the channels. This simulation is a multichannel CSMA protocol that provides a higher throughput compared to the single channel counterpart by reducing the packet loss.

The multi hop wireless networks are used for without fixed base stations or wired backbone infrastructure. The nodes can be mobile and thus the network topology can change dynamically. These networks are very useful in military, law enforcement, emergency rescue or exploration missions, and other applications where the nodes to share the radio medium is a key issue that determines the performance of a packet radio network. receiver initiated busy tone protocol that requires the transmission of a "request-to-send" control packet from the source followed by a busy tone from the destination.

The multiple accesses with collision avoidance (MACA) protocol propose that the source and destination nodes complete an exchange of Request-to-Send (RTS) and Clear-to-Send (CTS) packets of the data packet is sent. If the source receives the CTS reply, it is confirmed that the destination node is free to receive the data packet under the channel conditions. This provides a motivation for improving the efficiency of the basic medium access mechanism in wireless used for transmitting control or data packets. a multichannel CSMA protocol with distributed channel selection as a basic channel access mechanism. The benefit from using multiple non overlapping channels for random access is varying levels of complexity.

To evaluate the performance of the proposed MAC protocol, we use an event driven simulator which contains details of an indoor radio propagation model, multipath fading and parameterized radio receiver characteristics. a multichannel MAC protocol with distributed channel selection to reduce channel contention in packet radio networks. The nodes to sense the carrier powers on all channels and employs a protocol similar to CSMA/CA on the channel of the lowest power. The Simulation experiments have the medium access method has a higher throughput in comparison to the CSMA/CA protocol using a single channel, due to a lower probability of packet collisions.

7. "On distributed dynamic channel allocation in mobile cellular networks"

A channel allocation algorithm used for a channel acquisition and a channel selection scheme. The centralized schemes are neither scalable nor reliable. But in distributed dynamic channel allocation algorithms have a high reliability and scalability. The geographical area is divided into regions called cells. Each cell has a cell site or base station that is referred in mobile service station (MSS) and numbers of mobile hosts (MH) are in mobile. The drawback is that there is the bandwidth is the limited resource in cellular mobile system. In cellular communication mainly two types of channels are MH and MSS: communication channel and control channel. The purposed schemes are to assign channels in the way of channel utilization is maximized at the same time maintaining the voice quality.

The channel allocation schemes can be classified into three categories, Fixed channel allocation (FCA), Dynamic channel allocation (DCA) and Hybrid channel allocation (HCA). In fixed channel allocation, a set of channel is allocated to each cell of the system. When user requests a channel for communication, the free channel in its own cell, if the free channel is available assigned to the user. In dynamic channel allocation that are allocated dynamically as new calls arrive in the system and is achieved by keeping all free channels in a central pool. In hybrid channel allocation, few channels are allocated to each cell and the remaining channels are allocated dynamically. The performance of the hybrid channel allocation schemes are intermediate between fixed channel and dynamic channel allocation schemes. The dynamic channel allocation schemes are divided into two types centralized and distributed. In Centralized dynamic channel allocation (CDCA) schemes, a channel is selected for a new call from a central pool of free channels. The simplest scheme is to select the first available free channel that can be satisfying the reuse distance. Also that free channel can be picked which can minimize the neighborhood of the cell. A channel is selected for a new call from its cell or interfering neighboring cells.

A channel allocation algorithm having a two phases: A channel acquisition phase and channel selection phase. The task of channel acquisition phase are used to collect the information of free available channels from the interference cells. The channel selection phase is choosing a channel from the number of available free channels to get better channel utilization in terms of channel reuse. Each cell contains a mobile service station, the mobile service stations are connected by wired network to the mobile service station. Distributed dynamic channel algorithms have received more attention because of high reliability and scalability. Most of the algorithms did not make full use of the available channels. The proposed channel allocation algorithm makes efficient reuse of channels using resource-planning model with reducing the cluster size.

Conclusion

In this paper, we have studied about various clustering and routing protocols. But some is protocols are too costly to implement in real time. The results of these protocols are analyzed. Compared to all the result proxy encryption algorithm gives the better result and is cost effective.

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A Brief Author Biography

1. **Gayathri.V** – P.G. Scholar, Department Of Computer Science and Engineering, Hindusthan College Of Engineering And Technology, Coimbatore, Tamil Nadu, India.

2. **Mr.Sudhakar.K** - Assistant Professor, Department Of Computer Science And Engineering, Hindusthan College Of Engineering And Technology, Coimbatore, Tamilnadu, India.