Performance Evaluation of Resource Allocation Technique in Wireless Mesh Network

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Abstract
Resource allocation in wireless network is very critical issue. Due to increasing rate of user demands the dedicated bandwidth for access of data. The limited number of resource used sharing of channel for communication and raised a problem of channel interference. The channel interference decreases the performance of wireless network. Now a day's various authors used various channel allocation technique for allocation of resource for the improvement of communication capacity. In this paper study of some experimental analysis of resource allocation technique in wireless mesh network. Some technique is DCF, game theory and FCA. All method analyzed in MATLAB software and used number of mobile router up to 200.

Keywords- WMN, OFDMA, GA, Game Theory.

INTRODUCTION

Data communication plays a vital role in Inter-networking and computer network which is considered as the most important for each person in a real life. Wireless Mesh Networks (WMNs) have become the focus of much research since they allow for increased coverage while retaining the attractive features of low cost and easy deployment. WMNs have been identified as key technology to enhance and complement existing network installations as well as provide access where traditional technology is not available or too costly in install [1]. A WMN is made up of mesh routers (MRs), which have limited or no mobility, and mesh clients (MCs) which are often fully mobile. The mesh routers form the backbone of the network allowing the clients to have access to the network through the backbone. Many protocols currently implemented for WMNs have evolved from traditional single-hop wireless local area networks (WLAN) and mobile ad-hoc networks (MANET) [2]. However, both of these networks have characteristics which make them very different from WMNs. While WLANs have relatively static topologies, MANETs on the other hand are fully mobile. Therefore, using protocols designed solely for either of these networks alone does not take advantage of some of the most advantageous features of WMNs. In MANETs all nodes are routers and suffer from limited power and bandwidth. In a WMN the MRs have greater resources available than the MCs which is a property that may be exploited. Although a lot of research efforts have been made to address these problems and some new specialized algorithms have been proposed specifically for WMNs, there are still many challenges in the area. Many of the existing solutions make many assumptions that can be relaxed to allow for a more general approach to be taken. There are several popular architectures which can be used for cross-layer design in WMNs. Section II explores major contributions in the field of wireless mesh networks with the problem of resource allocation and some other problem discuss in review. A problem formulation in section III. Section IV describes the experimental process and result of some existing methods. Finally, concludes the paper.

II. RELATED WORK

This section gives an extensive literature survey on the existing wireless networks protocol and their issues. They study various research paper and journal and know about wireless network protocol based on various optimization algorithm. Cooperative resource allocation in wireless networks has been considered in recent research works. The general objective is the computation of efficient allocations, while accounting for wireless node interference. A simple solution to OFDMA resource allocation consists in allowing random access to the spectrum in a first-in-first-served fashion, where a variation of ALOHA for the OFDMA time-frequency domain is presented. However, in congestion situations this is expected to offer low throughputs, as discussed in introduction. in process of review study various paper related to cooperative allocation of resource in OFDM for mesh network. Some work discuss here.

[1] In this paper author C-DFP mechanisms, implementable when the operator has full control of the WMN equipment present a suboptimal fair resource allocation scheme in WMNs that maximizes the throughput and guarantees a quality of service (QoS) level. Similarly, to satisfy QoS levels,

propose a more distributed dynamic resource allocation model: users subscribe for guaranteed transmission rates, and then the network periodically reallocates unused bandwidth with short-term service level agreements to users stress the potential of effective interference detection for channel assignment, in virtual cut through switching-based networks. Using information on link and possible interference, they solve the resource allocation problem as an edge-coloring problem, where only chosen routes are considered for channel assignment.

[3] In this paper author address the problem of subcarrier-bit-power allocation for OFDM systems has been researched extensively with respect to the physical layer. Due to the hardness of the problem, the joint optimization problem is usually decoupled into two sub-problems. The objective function is to maximize the total achievable rate. However, with a Hungarian approach, the complexity is at least on the order of O (N3), where N is the number of subcarriers. QoS demands and fairness constraints are taken into account, where heuristic schemes are proposed for convex optimization problems (e.g., the signal-to-noise-ratio (SNR) maximization problem).

[7] In this paper, author focuses attention on the proposals for solving the channel allocation problem for Multi-Transceiver per node in the backbone level using the IEEE 802.11s technology. They classify these proposals into three categories. The first one consists on channel allocation proposals done at the MAC level independently to the other layers. The second one consists on a channel allocation approaches done by a modified MAC collaborating with upper layers. Finally, the third category concerns channel allocation methods implemented in a new layer resulting from a common-layer design between MAC and Network layer.

[8] In this paper author proposes and analyzes an optimum decentralized spectrum allocation policy for two-tier networks that employ frequency division multiple access (including OFDMA). The proposed allocation is optimal in terms of Area Spectral Efficiency (ASE), and is subjected to a sensible Quality of Service (QoS) requirement, which guarantees that both macro-cell and fem to cell users attain at least a prescribed data rate. Results show the dependence of this allocation on the QoS requirement, hotspot density and the co-channel interference from the macro-cell and surrounding fem to cells.

[9] In this paper author investigate a possible user cooperation path to implement strategic resource allocation in OFDMA WMNs, under the assumption that users want to control their interconnection. In this case, a novel strategic situation appears: how much a MR can demand, how much it can obtain and how this shall depend on the interference with its neighbors. Strategic interference management and resource allocation mechanisms are needed to avoid performance degradation during congestion cases between MRs.

III PROBLEM FORMULATION

Here we study various research and journal paper related to centralized allocation of resource such as channel allocation and channel sharing. The process of channel allocation and channel sharing induced the value of interference. The value of interference decease the performance of mesh network. The traffic congestion is also a major problem in wireless mesh network. The traffic problem resolved by game theory application, but this application increase a problem of delay factor. Some point of problem defines here.

1. Game theory method take more time when no. of node is maximum.

2. I can't find easily that who is channel free.

3. In traffic congestion condition this is expected to offer low throughput.

4. Fairness problem

IV. EXPERIMENTAL RESULTS

For an experimental process we used the value of number of node with using wireless mesh network resource allocation techniques for the group of nodes 10, 20,30 and 40 etc. all these nodes are apply to resource allocation techniques and the find elapsed time, degree of interference etc.

Method Name	Number of MR	Throughput	Elapsed Time
Game Theory	10	29.05	22.55
	20	35.05	32.06
	30	29.04	27.45
	40	38.07	31.76
DCF	10	26.05	16.93
	20	36.05	34.04
	30	34.04	30.08
	40	35.06	32.26

Table 1: Comparative result of some existing algorithm.

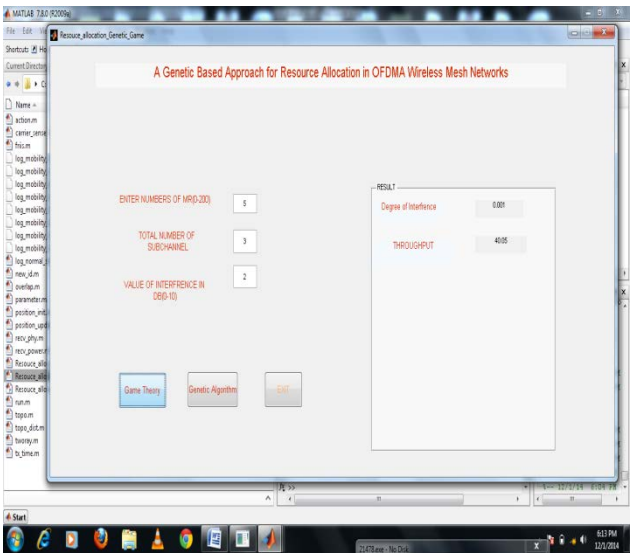

Figure 2: Shows that the window for Wireless Mesh Networks in OFDMA using GAME THEORY.

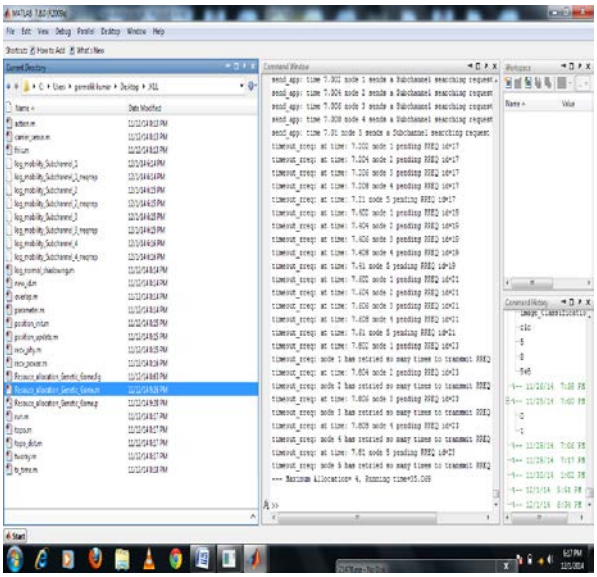

Figure 3: Shows that the window for Time request procedure and Running time value for Wireless Mesh Networks in OFDMA with maximum number of allocated node is 10 for Game theory.

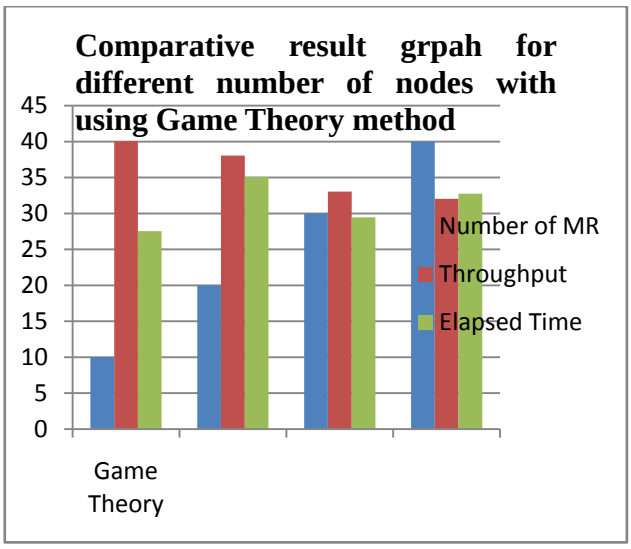

Figure 3: Shows that the comparative result graph for performance evaluation for the maximum number of node is 10, 20, 30 and 40 with using Game Theory, find the Degree of interference, Throughput and Elapsed Time.

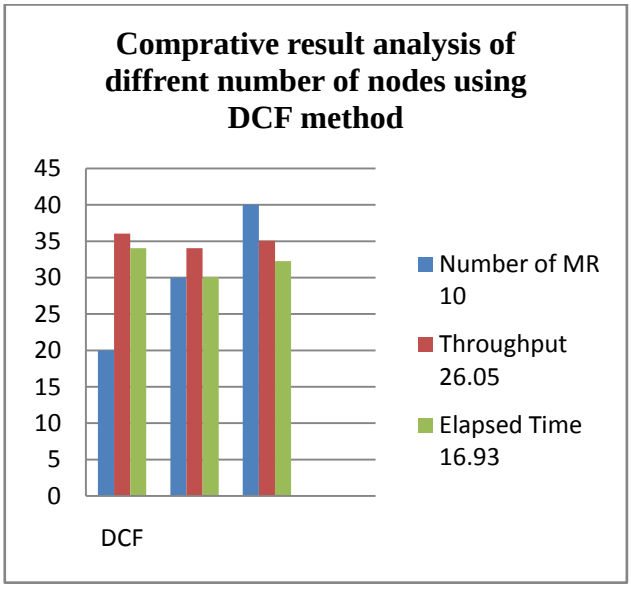

Figure 4: Shows that the comparative result graph for performance evaluation for the maximum number of node is 10, 20, 30 and 40 with using DCF, find the Degree of interference, Throughput and Elapsed Time.

V. CONCLUSION AND FUTURE WORK

Without communication our life is not possible. In recent years, technological innovations and internet has radically emerged and been introduced in many workplaces. Technological change is one major aspect which has

influenced the communication approaches in the organizations. Computer mediated communication is a form of human communication using computer and internet networks and this internet based communication take place on global collection of networks that uses the transmission control protocol/Internet protocol (TCP/IP) suite for data exchange. It is a type of communication which allows people to combine numerous media in a single message when conversing. The proposed algorithm is very efficient in terms of throughput and elapsed rate. In the case of proposed algorithm throughput is decrease. In this paper we proposed a game theory method of for resource allocation. In future for the improvement of channel selection used genetic algorithm.

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