

# Implementation of an Efficient Broadcast Model for Wireless Mesh Network

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**Abstract:** Wireless mesh network (WMN) has become an important leading technology which provides several types of useful applications such as community network, broadband home network and internet access, etc. The rise in the size of users in WMN has created a degradation of efficiency in a network especially in dense areas due to the clumsy channel allocation and hence creating many challenges for enhancing the users experience, network quality and throughput. Therefore in this paper, we proposed OCA based AIF model that can access the channel information and then it process to improve the RF channel association. The proposed OCA-AIF will function for each period when some interference is detected via AIF and we further extend this analysis by taking into consideration the influence of interference to provide a high quality indicator in network. The analysis of result shows the optimization by our proposed approach which increases as per the increment of relay nodes (RNs).

## KEYWORDS

Wireless Mesh Network (WMN); Adaptive Informant Factor (AIF), Optimized Channel Allocation (OCA), Relay Nodes (RNs)

## I. INTRODUCTION

In the last several years, there is an extensive demand for portable devices such as tablets and smart phones, which are having user friendly interface, nice affordable price and functionality. These circumstances have created a high demand for wireless spectrum in wireless Mesh networks (“WMNs”). The presence of unutilized licensed or non-licensed frequency spectrum in WMN facing the significant amount of spectrum allocation difficulty, more specially in dense areas such as shopping complex, commercial area etc., where the closer RNs interfaces with each other RNs in order to acquire the spectrum. These types of interferences in between the RNs in a network can cause negative effect in terms of user experiences; also it can degrade the user throughput and provide lower connection quality. The radio signal interference in WMNs has been an advanced topic for the researchers and provide major challenges that has been studied in also several contribution has adopted in order to build optimized model that tends to tackle the interferences in dynamic channel allocation. There are different assumptions, made while considering channel allocation for WMNs and hence, the different approaches and solutions are considered by the authors. However, the general channel allocation prototype have been studied such as static channel allocation and dynamic channel allocation, where in static allocation the interfaces are allocated channels permanently while in dynamic allocation the interfaces are permitted to switch to another channels. In considering the static channel allocation, the traffic information in network is assumed by the approach due to its collective traffic load at each “mesh-router” deviates infrequently. In [1], they proposed a model to resolve the joint channel assignment and routing issues that can compute a routing approach as well as channel allocation approach, which causes all traffic information to be satisfied. In [2], they used formulation of linear programming with the fairness and interferences constraints. In addition, they assumed an approximation approach to obtain a joint channel assignment and routing scheme. Moreover, other studies have considered the statistical pattern of traffic in a network instead of appropriate profile of traffic, in [3] they assumed that, the internet gateway traffic from/to the clients is crucial, therefore they initially build a routing tree of load balanced from the actual network topology and afterwards they used a load aware distributed approach to allocate the channels for links on tree. While considering the other scenario, the peer-to-peer traffic was taken to be the essential in [4], where the authors have generated a k-linked backbone from the actual network topology and afterwards they allocated channel on the generated topology in order to minimize the interference. However, a prioritized-MAC

(medium access control) convention is proposed for WSNs in [5] by considering the binary count-down methodology. Prioritized-MAC viably disposes the information crash and improves channel designation additionally. It offers strict administration separation for organizing the packets and it can be assessed by impact likelihood, renegeing/dropping likelihood and channel effectiveness. Based on the frequent access to the channels, the dynamic channel allocation can be split into short-term and long-term, where in short-term the channel switching takes place frequently and less frequently in long-term. There are some link level type dynamic allocation strategies has been proposed [6] [7], where the rate of channel switching is very frequent among the nodes and wanted to communicate with the other nodes, therefore it causes the switching overhead and required a coordination mechanism. This dynamic channel allocation approaches can be categorized into different types such as in first one, an individual interface from a node is only purpose to control [6] and this type of model does not need any synchronization among the presented nodes but these may not utilize the resources efficiently. In considering the second type, there will be no separate interface is dedicated to control, therefore the resources may utilize more efficiently but the nodes required synchronization among them [7]. In [8], they showed a different channel allocation scheme for IEEE 802.11, based on systems with point-to-point joins, which are mainly intended for the rural areas. This channel allocation scheme permits consistent full-duplex information exchange on each connection in the system. Therefore, the channel allocation scheme doesn't require any synchronization over the connections as the channel task prevents cross connection interference. The several approaches for dynamic channel allocation requires very less frequent channel switching which are proposed in [9], [10], [11]. A centralized server monitoring is proposed in [9] for the environmental changes; it re-computes the channel allocation in network and also acknowledge nodes to select channels at a time period. In [10], they shown the channel allocation approach and distributed routing at each flow; it was particularly developed for the network with each nodes maintaining two radios. The different approach of learning has been proposed in [11,12,13], that the nodes separately acquire their channel allocation based on the information of channel usage in neighborhood. In addition to that, the learning approach requires some time to congregate to optimized channel allocation whenever the traffic pattern got changed at each time. Therefore, in this research article we aim to study the link level OCA on dynamic interfaces. The rapidly increment of the licensed and the non-licensed users in WMN has created a challenge for the user experience, network quality and throughput, which causes degradation of efficiency in a network notably in a dense areas due to the clumsy channel allocation. In addition, the RNs operational areas are growing significantly; therefore the network architecture availability and virtualization model of network has motivated us to use the full resources present in a network via resource management [14,15]. In this article, we are proposing OCA based AIF model that can access the channel information and then it process to improve the RF channel association. The proposed OCA-AIF will function for each period when some interference is detected via AIF and we further extend this analysis for interference influence as the basis, to provide a high quality indicator in network. The organization of RF channels and RNs is done under IEEE 802.11s standard; in result section we compared our proposed OCA-AIF model with respect to other approaches in same environment to validate the performance analysis.

## II. PROPOSED WIRELESS MESH MODEL

The WSN is a developing technology that gives high quality service to last customers as the "Last mile" through the internet. The multicast communication is a key for WSNs and among a group of nodes multicast gives efficient data distribution and hence maximize throughput. Multi channel multicast (MCM) approach is proposed to Multichannel Mesh Networks that uses Heuristic channel assignment algorithm to improve the throughput and bandwidth information to provide the efficient routing. A novel route mass is considered to capture all available path and the available path bandwidth and it is used as the maximum additional rate flow which can push before the saturating path. WSNs at high density deployment are very difficult to monitor and its result may cause strong channel interference at dissimilar networks. To address the interference of adjacent channels and co-channels, the researcher uses channel allocation to increase the framework presentation for multiple WSNs. In an initiative model of a channel interference to compute the interference effect of bit ratio at framework; afterwards the issue is expressed in channel allocation. They also suggested a genetic algorithm for establishment of channel task technique in order to reduce the interference effect. Investigated the routing issue and channel allocation for the transfer of information in WMN by considering the half duplex communication. In addition to that, the channel allocation is associated with the

interference constraints (here considered linear constraints); which are recognized as a set of “routing constraints”. A mixed integer LP (linear programming) is formulated for the issue and suggested to maximize the minimum spare volume link separately. They also showed the impact of sub-issues that originated from the channel allocation and routing process for large size of networks. This type of technique might decrease the issues originated via decreasing the resolving period; also examine the issue for huge networks with the small traffic necessary for the optimal transmission. The capacity reduction in WMNs is somewhere the main object for wireless links amid interference and utilization of mesh router in multiple radio interference with the diverse frequency channel to increase the network capacity. Moreover, another efficient path to utilize a central controller to consign correctness of radio interfaces to frequency channel may significantly decrease the interference; therefore devising a routing protocol involving an interference study is an important feature in order to find a way to get notably throughput gain. Afterwards, the software-defined networking provides extra malleable and wieldy networks through decoupling data plane and control plane, which applied with logically centralized controller in organization and device; generally it should be the appropriate choice. The thing provide the theoretical analysis to utilize a regulator in SDN wireless sensor networks to allocate generated channels to make routing decision, and provide static channel assignment model to build a continued interference between the joins.

While considering the multi-channel and multi-radio WMNs, the combined channel task and routing issue has been discovered. The performed a rate-variable model in order to increase the network throughput which uses the physical interference model and it can estimate the capacity of network more accurately. Afterwards, they provided the measured programming model that allows formulating the assignment of combined channel task and issues of integer linear programming. Although achieving ‘ ’ provisioning is always an important problem, CN provide a flexible type construction which allows the efficient sharing of heterogeneous networks with the transmission resources, therefore the secondary networks at the channel switching frequency has a clear impact on the QoS performance at CN; a borrowed channel by a secondary network is return back when demand occur by the primary network side. Initially they proposed a novel secondary channel algorithm and afterwards a flexible CN architecture for IEEE802.11 based WLANs. These proposed CN architecture uses a Geo-location database as the repository of shared channel information, which could be utilized by secondary networks. In addition, the secondary networks claim to exploit the QoS with traffic in secondary networks, so that the features of obtainable channels in the secondary networks and the planned channel allocation algorithm are enhanced by considering the shared spectrum. In the examined research for using DCNs (‘Data centre networks’) in wireless network transmission and their works proposes to resolve the congestion issue caused by some “hot nodes” in order to increase the global performance of network. The model of DCN in wireless transmission sees both the adaptive transmission-rate and the wireless interference. However, both material and time completion for task is taken into account and estimated the impact of global performance on the wireless transmission. However, the establishment of this classical prototype express the channel allocation in wireless DCNs as an optimization process and projected a GA (genetic algorithm) based model to address it and the validation is performed to check the efficiency of GA-based algorithm as well as the wireless transmissions in a wireless DCN. The issue of power control and channel allocation for interference channels with respect to multiple control loops is examined. Here a scheduler assigns the control for transmitting power and the wireless channels based on practical channel situations. This methodology can promise a required QoS and can reduce the regular transmitting power instantaneously. Therefore, the fact is expressed as an optimization issue also it is answered by an older gradient decent technique. It is an offline algorithm suitable for find the optimal allocation rule to set onward. The specified algorithm is complex to apply in the preparation of the channel distribution; hence, a stochastic sub-gradient ascent algorithm is planned; which is established on presenting the practical channel state and it is showed that the stochastic optimal cost joins are little close to the optimal required value in a network.

### III. CONCLUSION

The extensive demand of portable devices has created a high demand of wireless spectrum in WMN. The unutilized licensed or non-licensed frequency spectrum in WMN causes difficulty in channel allocation especially in dense area network, which degrade the users throughput and grants lower connection quality. In this study, we proposed the OCA-AIF in wireless mesh environment and the channel allocation of RNs is based on the AIF. The proposed OCA-AIF will

function for each period when some interference is detected via AIF. In result analysis section it has clearly shown that our proposed model got significant amount of improvement w.r.t other existing technique. By increasing the number of RNs improves the data-rate transmission that tends to increase the packet transmission rate.

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