# CHANNAL ASSIGNMENT BASED ON LOAD FOR MULTI CHANNEL MULTI RADIO WIRELESS MESH NETWORK

Arepalli peda gopi#1 , Dr.A.Srinivasa Rao#2

*Computer networks(M.Tech),KLuniversity(vaddeswaram)*

E-mail:gopiarepalli2@gmail.com

*Prof –CSE- K L University(vaddeswaram)*

E-mail:drsrinivas@kluniversity.in

*Abstract:* **Many efforts have been devoted to maximizing network throughput in a multichannel multi radio wireless mesh network. Most current solutions are based on either purely static or purely dynamic channel allocation approaches. In this paper, we propose an algorithm based on link load and load at each and every node. In mesh node has both static and dynamic interfaces. In this paper we propose a new channel assignment scheme based on traffic and load on each channel.**

**Key words:** Wireless mesh network, load, channel

## 1. INTRODUCTION:

Wireless mesh networking has attracted great research interest recently. It has become a promising technology that has the potential to enable many useful applications. One major problem facing Wireless Mesh Networks (WMN) is the capacity reduction due to wireless interference.

Technology advances have made it possible to equip a wireless mesh router with multiple radios, which

Can be configured to different channels, and thus reduce network interference. Therefore, a major challenge in multi radio multichannel wireless mesh networks is the allocation of channels to interfaces of mesh routers so that the network capacity can be maximized. There are currently two approaches of channel allocation, that is, static approach and dynamic approach. In static channel allocation, each interface of every mesh router is assigned a channel permanently. In dynamic channel allocation, an interface is allowed to switch from one channel to another channel frequently. Both strategies have their advantages and disadvantages. Static strategies do not require interfaces to switch channels, and thus have lower overhead. However, they depend on the stable and predictable traffic patterns in the

Network. For example, require that the exact traffic profile is known ahead, while assume known statistical traffic patterns. Dynamic strategies, such require frequent channel switching, and thus have higher overhead than static strategies. However, as the channel allocation can be changed with the changing traffic, dynamic strategies are more appropriate when the network traffic changes frequently and is unpredictable. In the real environment, the overall traffic profile usually complex. It not only contains some predictable traffic. Due to the inflexibility of purely static channel allocation and the high overhead of purely dynamic channel allocation, we propose a hybrid architecture in this paper, which combines the advantages of both approaches. In this architecture, one interface from each router uses the dynamic channel allocation strategy, while the other interfaces use the static channel allocation strategy. The links working on static channels provide high throughput paths from end-users to the gateway while the links working on dynamic channels enhance the network connectivity and the network's adaptively to the changing traffic. Therefore, this hybrid architecture can achieve better adaptively compared to the purely static architecture without much increase of overhead compared to the purely dynamic architecture.

In this paper, we discuss several important issues in the hybrid wireless mesh network. 1) The system architecture: as each mesh node contains both static and dynamic interfaces, we discuss on how to coordinate the channel assignment between both types of interfaces, so that the channel resources could be utilized efficiently. The channel allocation for dynamic interfaces: Multichannel MAC protocol (MMAC) is currently one of the most efficient dynamic channel allocation protocols. However, the channel assignment in MMAC is optimized only for network throughput. We propose an Load aware

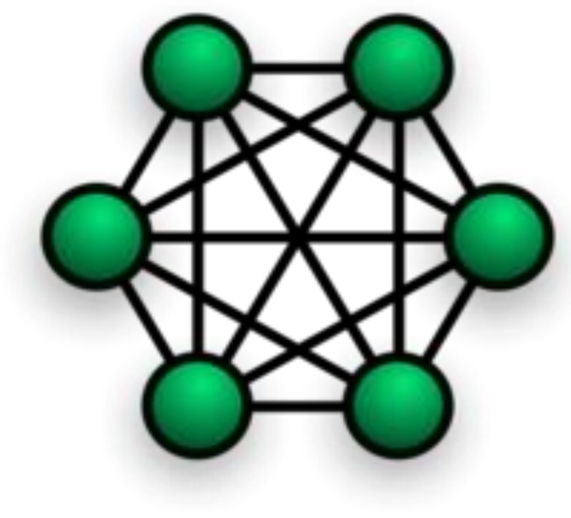

**Fig.1 Multi mesh**

Dynamic Channel Allocation protocol (LADCA), which considers both throughput and delay in the channel assignment. Compared with MMAC, LADCA is able to reduce the packet delay without degrading the network throughput. 3) Routing decision in the network: in the hybrid structure, we have static links and dynamic links, both of which can be used to transmit data. We propose an Load Aware Routing protocol which aims at balancing the channel usage over the network and thus improve the network throughput.

## 2. RELATED WORK:

Wireless mesh networking is becoming an important technology that enables many useful applications, including broadband home networks, community networks, broadband Internet access, etc. A survey has been provided in A major problem facing multi-hop wireless networks is the capacity reduction due to interference among adjacent wireless links. There have been some studies on the effect of wireless interference on the same channel and on partially overlapping channels Jain et al. studied the throughput of a single-radio single-channel

Wireless network with respect to wireless interference. They formalized it as a multi-commodity flow problem with constraints from conflict graph, which is NP hard, and gave an upper bound and a lower bound of the problem.

There have been many studies on how to assign limited channels to network interfaces in a multi radio multichannel wireless mesh network so as to minimize interference and maximize throughput. They differ in several assumptions made in WMNs, and therefore in the models and related solutions. Two basic channel allocation strategies have been studied

1) static channel allocation, where interfaces are assigned channels permanently.

2) Dynamic channel allocation, where interfaces are allowed to switch to different channels.

Allowed to switch to different channels. In static channel allocation, one approach assumes a known traffic profile in the network, because the aggregate traffic load of each mesh router changes infrequently. The Raniwala et al. proposed an iterative approach to solve the joint routing and channel assignment problem, which can calculate a routing scheme as well as a channel assignment scheme, such that all traffic profiles are satisfied.

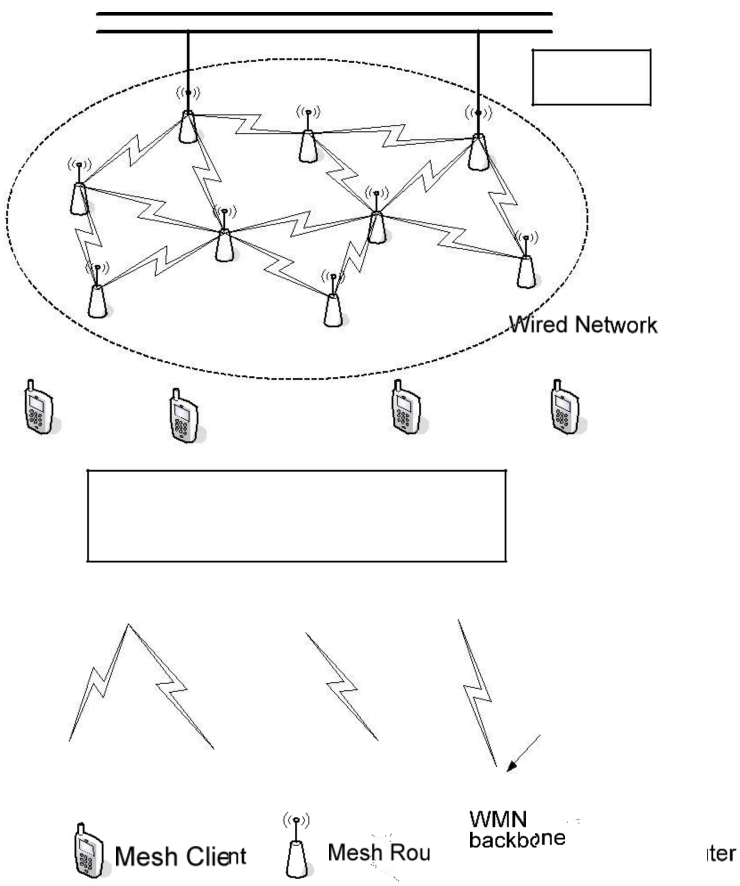


**Fig.2 WMN architecture**

 

### *A. Load aware dynamic channel allocation:*

In load aware dynamic channel allocation first we have to estimate load at each node and load at each link. This approach takes into account the network traffic profile. LADCA algorithm assigns radio channels to links considering their expected loads and interference effect of other links, which are in interference range and which are tuned to the same radio channel.

In the first phase, algorithm estimates initial loads on all links based on the initial routes created by routing algorithm. After load estimation, LADCA randomly assigns channels to all nodes for each radio interface. In the second phase, LADCA algorithm uses similar steps as in the first phase, but channel assignment and routing iterations are based on results from the first phase. If some of the link load is higher than link capacity, the algorithm goes back and tries to find better solution. Algorithm's iterations end when no further improvement is possible. In optimization phase, LADCA uses greedy load-aware channel assignment algorithm similar to the one used in LACA algorithm (Raniwala et al., 2004). In this algorithm virtual links are visited in decreasing order of the link expected load. To find routes between nodes, LADCA uses shortest path routing based on minimum hop count metric.

### B. *Calculation load for each link:*

This approach is based on the concept of load criticality. The method assumes perfect load balancing across all acceptable paths between each communicating pair of nodes. Let P(s, d) denote the number of acceptable
paths between pair of nodes (s, d), Pl (s, d) is the number of acceptable paths between (s, d) which pass a link l. And finally, let E(s, d) be the estimated load between node pair (s, d). Then the expected traffic load XL on link l is calculated as XL.

$$XL = \Sigma\ PL(s, d)/ P(s, d)*E(s, d)$$

P(s, d) = denote the number of acceptable paths between pair of nodes (s, d)
Pl (s, d) = number of acceptable paths between (s, d) which pass a link l
E(s, d) = estimated load between node pair (s, d)

This equation implies that the initial expected traffic on a link is the sum of the loads from all acceptable paths, across all possible node pairs, which pass through the link. Because of the assumption of uniform multi-path routing, the load that an acceptable path between a pair of nodes is expected to carry is equal to the expected load of the pair of nodes divided by the total number of acceptable paths between them. Let us consider the logical topology.

$$XL= PL(a, g)/P(a, g)*z^(a, g)+ PL(i, a)/P(i, a)*z^(I, a)+ PL(b, j)/P(b, j)*z^(b, j)$$

### C. *Link capacity estimation:*

The link capacity (channel bandwidth available to a virtual link) is determined by the number of all virtual links in its interference range that are also assigned to the same radio channel. So when estimating the usable capacity of the virtual link, we should consider all traffic loads in its interference range. According to the channel assignment rules, the higher load a link is expected to carry, the more bandwidth it should get. On the other side, the higher loads its interfering links are expected to carry, the less bandwidth it could obtain.. Thus, the link capacity should be proportional to its traffic load, and be inversely proportional to all other interfering loads. Thus, the capacity Ew(i) assigned to link i can be obtained using the following equation:

$$Ew(i)=Xi \ / \ \Sigma Xj \ *Cch$$

$$J \in inff(j)$$

## 3. ALGORITHM

Allocation of channels to the multi mesh multi radio network will be described in this algorithm

For to propose this algorithm first we divide the load calculated above was divided into three categories

First we allocate channels based on the value of Ew(i) and XL values here the three catagories are

1. low traffic

2 .medium traffic

3. high traffic

*Input :* hear the input for this algorithm is load of each channel is given so here we allocate channel for the nodes to transfer data effetely.

 

*Output*: allocate a appropriate channel for each and every node based on load and to achieve good through put and less time to take transfer data.

For every node;

{

Channel capacity EW(i);

Link load XL;

}

If(EW(i)>>XL)

{

Low traffic;

}

Else if(EW(i)>=XL)

{

Medium traffic;

}

Else

{

High traffic;

}

For every node

If (low traffic)

{

//Send more amount for data through this channel

So it is suitable for send large amount of data from this channel ;

}

else if(medium traffic)

{

Send low traffic;

It is suitable for medium data transfer;

}

Else

{

Unable to handle traffic because it is busy;

}

**CONCLUSION:**

In this paper we propose a load aware channel allocation for appropriate channel allocated for the each and every node to transfer packets. so by this type of channel allocation we get good through put and decrease the packet delay and also decrease the congestion in channels. So compared to the static channel approach and other approaches it is the best way to allocate channels, our target at here is allocate appropriate channel at each and every node. In this paper we propose a algorithm based on load and which channel is suitable to carry this load.

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