International Journal of Engineering Science Invention
ISSN (Online): 2319 – 6734, ISSN (Print): 2319 – 6726
www.ijesi.org Volume 2 Issue 9 ‖ September. 2013 ‖ PP.20-25

Performances Anlazaying of Dynamic Channel Allocation Using ARSCA

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ABSTRACT: *Wireless Mesh Networks (WMNs) consist of mesh routers and mesh clients for their lifetime, multihop wireless mesh networks (WMNs) experience frequent link failures caused by channel interference, dynamic obstacles, and/or applications' bandwidth demands. Dynamic channel allocation for effective autonomous network reconfiguration system (ARS), by analyzing ARS, it shows that by using ARS alone it won't provide a sufficient result such as network quality, leader assigning problems etc, so in order improve the network performance we going to implement a new concept Breadth First Search Channel Assignment (BFS-CA) algorithm against with ARS so that it will multi radio configuration for mesh network and channel assignment problems. We demonstrate our solution's through the evaluation of a prototype implementation in an IEEE 802.11 in ns2. We also report on an extensive evaluation via simulations. In a sample multi-radio scenario, our solution yields performance more gains compared E-ARS.*

INDEXTERMS: *IEEE 802.11, multiradio wireless mesh networks (mr-WMNs), E-ARS, BFS-CA networks, wireless link failures.*

I. INTRODUCTION

Wireless Mesh Network is growing very widely now a day. It is used in various applications such as public safety. Even though many solutions for WMNs to recover from wireless link failures have been proposed, they still have limitations as follows. First Autonomous reconfigurable system (ARS) outperforms existing failure-recovery methods, such as static greedy channel assignments, and local rerouting. Second load on channel vary over time. To achieve our goals then the existing work ARS, we propose, a new concept Breadth First Search Channel Assignment (BFS-CA) algorithm against with E-ARS so that it will multi radio configuration for mesh network and channel assignment problems. To sense and evaluate the current channel conditions, our network includes dynamic channel sensor nodes for multi-radio dynamic configuration. The dynamic channel detection sensors monitor and record the traffic on each channel. Using this technique BFS-ARS network with ARS, we show the performance of some experiments to determine the best set of properties about each different channel to be able to rank all available channels in terms of achievable performance. We can then build a dynamic channel allocation using ARS algorithm that will, according to the appropriate set of properties about the current channel utilization, choose and dynamically assign the best channel for the links in our wireless mesh network. A comprehensive performance study that shows significant throughput improvements in the presence of varying interference levels, which are validated through empirical measurements on a prototype implementation. Wireless mesh network consist of mesh router, mesh client, gateway. Functionality of mesh router is to forward packet to and from gateway which is connected to internet. Mesh client is nothing but your laptop or mobile. Gateway is one of entry or exit point from one network to another. In section II we define motivation for our project and drawbacks of existing system. Section III explains scope of our project. In section IV we have explained architecture of system and finally conclusion.

II. MOTIVATION

The channel assignment algorithm we propose in this paper is designed for wireless mesh networks. Routers in such networks are stationary. Whereas, user devices, such as laptops and PDAs, can be mobile. Such devices associate with routers.In ARS there is a leader node which is chosen by group member so whenever link failure occurs that information is given to the leader node. Leader node forward that information to gateway and all the functionality (like routing planning, reconfiguration) performed at gateway and send back to leader node. Finally, all nodes in the group execute the corresponding configuration changes.The main drawback of dynamic channel assignment is that it results into change in network topology, so to avoid this solution is that make mandatory one radio of mesh router to operate on default channel. This default radio is of the same physical layer technology IEEE 802.11a, 802.11b or 802.11g. A second drawback is channel assignment can result in disruption of flows when the mesh radios are reconfigured to different frequencies. To prevent flow disruption, redirect flow over default

COMPARISION WITH EXISTING ALGORITHM

* CS=centralized System DS=Distributed System

III. SCOPE

ARS is used for static channel allocation so we are developing a system to overcome this limitation named Dynamic channel allocation for effective autonomous network reconfiguration system (ARS). we propose, and evaluate a wireless mesh network with dynamically allocated channels. To sense and evaluate the current channel conditions, our network includes dynamic channel sensor nodes. The channel detection sensors monitor and record the traffic on each channel. Using this network, we can first perform some experiments to determine the best set of properties about each different channel to be able to rank all available channels in terms of achievable performance.

	Property	Switching Time	Connectivity	Ripple Effect	Topology control	Control philosophy
FIXED CA	CCA	NO	Ensured by CA scheme	No	Fixed	NA
	C-HYA	NO	Ensured by CA scheme	Yes	Fixed	CS
	CLICA	NO	Ensured by CA scheme	No	CA scheme define topology	CS
	MICA	NO	Ensured by CA scheme	No	CA scheme define topology	CS/DS
	MesTiC	NO	Ensured by CA scheme	No	Fixed	CS
	TiMeSH	NO	Ensured by CA scheme	No	CA scheme define topology	DS
HYBRID	LLP	YES	Ensured by channel switching	No	Dynamically changing	DS
	BFS-CA	YES (INFREQUENT)	Ensured by default radio	No	Fixed	CS
DYNAMIC	D-HYA	YES (INFREQUENT)	Ensured by CA scheme	No	No topology is defined by routing tree	DS

We can then build a dynamic channel allocation using ARS algorithm that will, according to the appropriate set of properties about the current channel utilization, choose and dynamically assign the best channel for the links in our wireless mesh network. We can then evaluate the performance gains offered by this allocation engine.The explosive growth in Wi-Fi deployments that operate in the same spectrum as wireless mesh networks, any static assignment will likely result in the operation of the mesh on channels that are also used by co-located Wi-Fi deployments. The resulting increase in interference can degrade the performance of the mesh network. For this reason our Channel Assignment algorithm addresses the channel assignment problem and specifically investigates the dynamic assignment of channels in a wireless mesh network. We chose the hybrid and centralized, interference-aware channel assignment algorithm BSF-CA as this channel assignment protocol aimed at improving the capacity of wireless mesh networks by making use of all available non-overlapping channels (i.e. IEEE 802.11) and that intelligently selects channels for the mesh radios in order to minimize interference within the mesh network and between the mesh network and co-located wireless networks. Hence, our first improvement will try to introduce this new information into the algorithm. Second, we will develop an algorithm that can be used in a wireless mesh network with more gateways available, this because the BSF-CA algorithm is designed to work on single-gateway WMNs.

IV. ARCHITECTURE OF SYSTEM

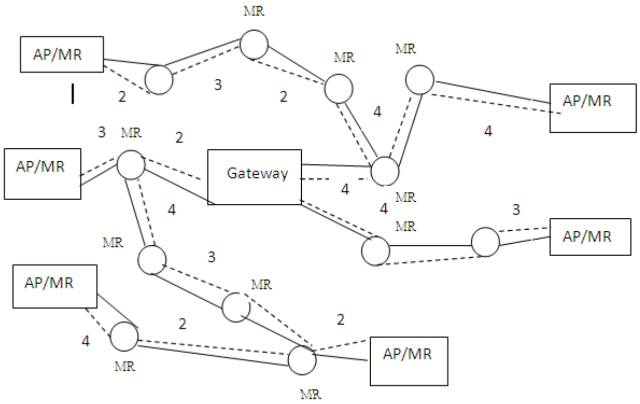


Fig 1.1 Architecture of ARS. Dotted link shows non-overlapping channel. Solid line shows overlapping channel. Fig.1.1 shows multi-radio multichannel wireless mesh network. The mesh routers are assumed to be equipped with multiple IEEE 802.11 radios, such as 802.11a, 802.11b, or 802.11g. Here we need to mandate each MR will be associate with one radio, called the *default radio*, which is of the same physical layer type, e.g. 802.11b. One of the routers is assigned as gateway or Channel Allocation Server (CAS). Access Points (APs) provide connectivity to user devices and are co-located with mesh routers. A majority of the traffic within the mesh is either from the user devices to the gateway or vice-versa. Therefore, in order to improve overall network capacity, it is preferable to place MRs close to the gateway and in regions of the mesh that are likely to experience heavy utilization The dotted lines in the figure show links between MRs that are tuned to non-overlapping channels. In our example, five such channels are used. A sixth channel, indicated by solid lines, is the default channel. The Channel Assignment Server (CAS), which is co-located with the gateway in the figure, performs channel assignment to radios.

Algorithm: ARSCA

Step 1: Generate topology

Step 2: Start flooding information and Channel assignment in server

A: for every link/node do

B: Exchange neighbor Nodes information.

C: end for

D: send neighbor node information to the gateway

Step 3: Select source node.

Step 4: Establish path from source to destination

Step 5: Start packet transmission.

Step 6: If packet received by node is destination then directly send packet to destination

Step 7: Then gateway receive monitoring result

Step 8: It Check node/link failures

Step 9: then group formation function execute Using bully algorithm Identify leader, group announcement function

Step 10: next check for planning ,before planning check channel assignment using bfs-ca and Calculate interference, create MCG, calculate link delay, assign channel

Step 11: next send planning request and receive planning request

Step 12: Generate Reconfigure plan and add information to planner list

Step 13: send reconfigure plan, receive Reconfigure plan

Step 14: update energy

Step 15: Stop

The algorithm starts by adding all vertices from the MCG to a list, *V*. It does a breadth first search of the MCG to visit all vertices and assign them channels. The search starts from vertices that correspond to links emanating from the gateway the smallest hop count vertex is determined of all vertices in the MCG. All vertices with distance equal to the smallest hop count are added to a queue, *Q*. If vertices correspond to network links emanating from the gateway, their hop count is 0.5. These vertices are then sorted by increasing delay values This sort is performed in order to give higher priority to the better links emanating from the shortest hop count router (the gateway for the first BFS iteration). The algorithm then visits each vertex in *Q* and permanently assigns them the highest ranked channel that does not conflict with the channel assignments of its neighbors If a non-conflicting channel is not available, a randomly chosen channel is permanently assigned to the vertex. Note, however, that the default channel is never assigned. Once a vertex is assigned a channel, all vertices that contain either radio from the just-assigned vertex are placed in a list, *L*. All vertices from *L* are removed from the MCG. This step is needed to satisfy the constraint that only one channel is assigned to each radio. The radios in the list of vertices that do not belong to the just-assigned vertex are tentatively assigned the latter's channel.

Vertices at the next level of the breadth first search are added to *Q*. These vertices correspond to links that fan-out from the gateway towards the periphery. To find such links in the MCG, two steps are performed. In the first step, the router from the just-assigned vertex that is farthest away from the gateway is chosen; the farthest router is the router with the higher hop-count of the two routers that make up the just-assigned vertex. In the second step, all unvisited MCG vertices that contain a radio belonging to the farthest router are added to the list, Tail. This list is sorted by increasing value of the delay metric to give higher priority to better links that emanate from the farthest router. Finally, the vertices from Tail are added to *Q*. The above described algorithm continues until all vertices in the MCG are visited. If there is a link failure while transmitting a packet do use of bully algorithm and on that basis select leader node amongst them. Start reconfiguration and generate reconfiguration plan. Reestablish path. Any radio that is not assigned a permanent channel during the search, because vertices containing it were deleted, is permanently assigned one of the channels tentatively assigned to it. Once channel assignments are decided, the CAS notifies the mesh routers to re-assign their radios to the chosen channels.

V. SYSTEM IMPLEMENTATION

We have used ns-2 in our simulation study. Throughout the simulation, we use a grid topology with 10 nodes in an area of 500*500 meter , as shown in Fig.1.2. Each node is equipped with a four number of radios, depending on its proximity to a gateway.

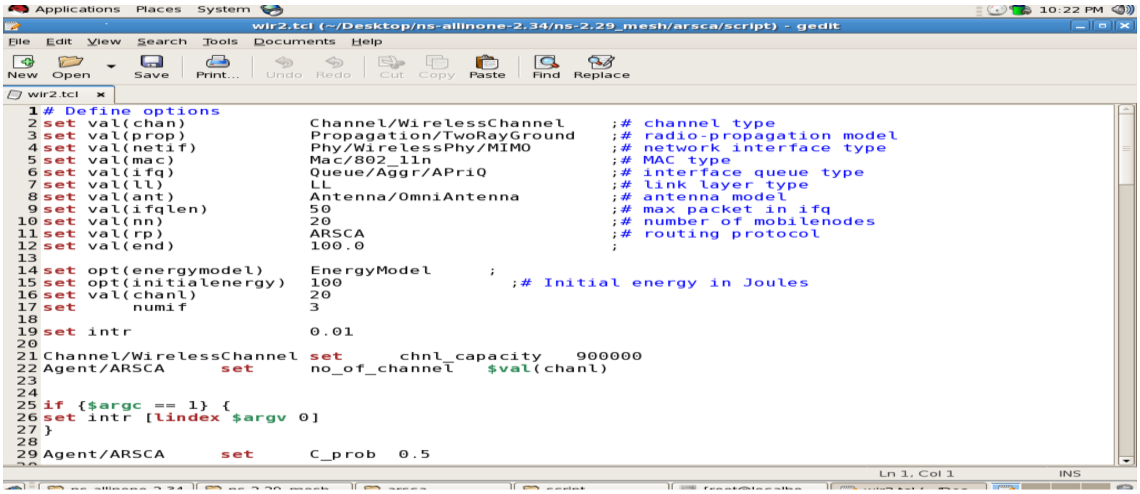
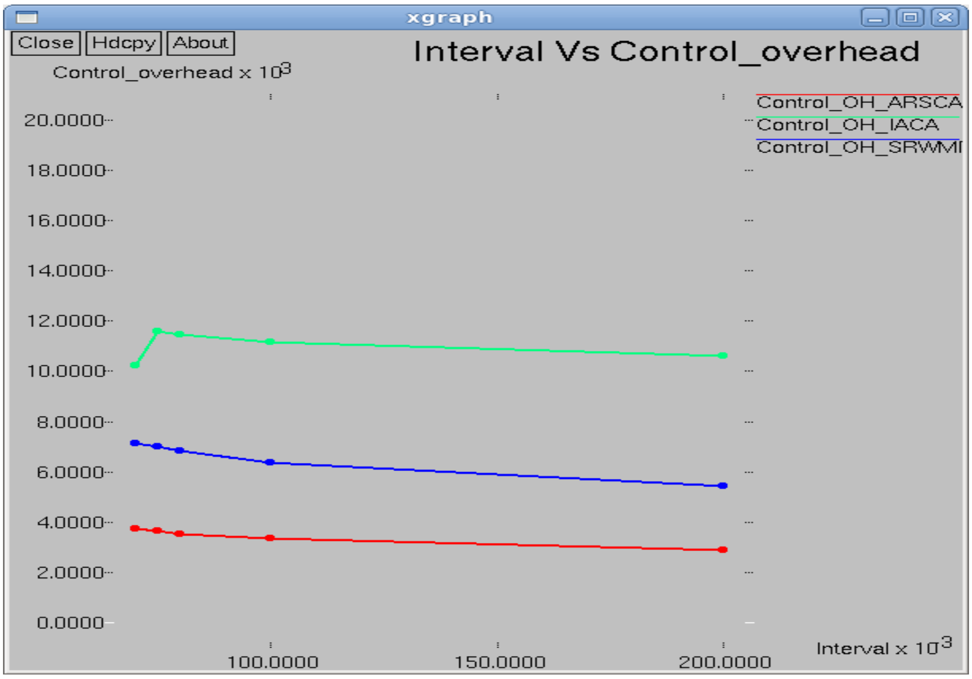
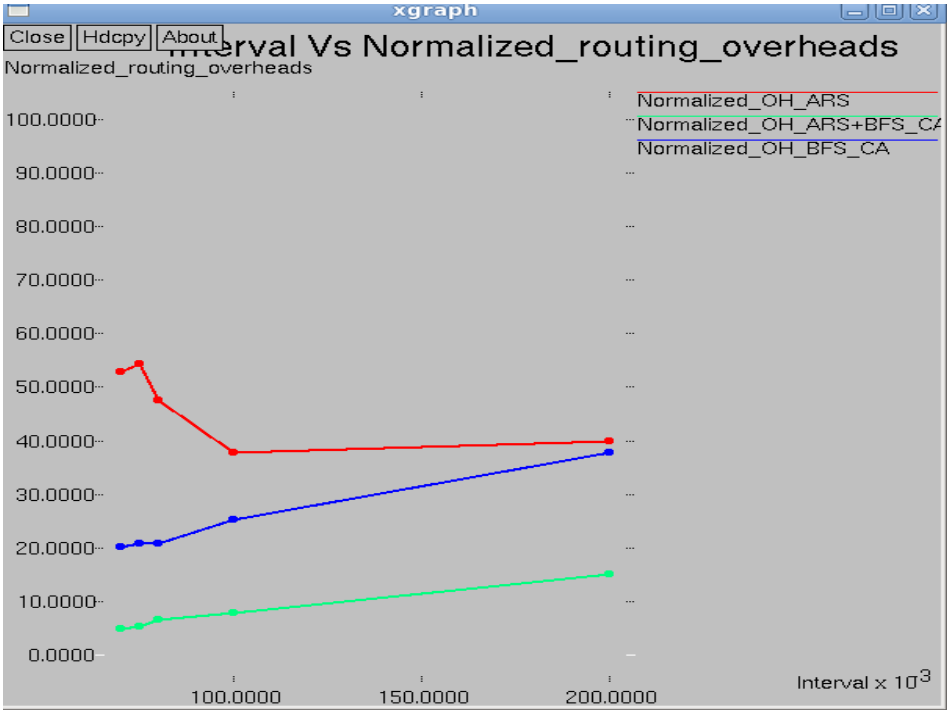


Figure 1.2 Node configuration code

For failure occurs instead of choosing next router that node is switched to another channel of same router.Next, IEEE 802.11 wireless extension is used for the MAC protocol with a varying data rate and is further modified to support multiple radios and multiple channels. Finally, SRWMN protocol is used for routing. In these settings, ARSCA is implemented as an agent in both the MAC layer and a routing protocol before. It periodically collects channel information from MAC and requests channel switching or link-association changes based on its decision. At the same time, it informs the routing protocol of network failures or a routing table update. There are several settings to emulate real-network activities. First, to generate users' traffic, multiple UDP flows between a gateway and randomly chosen mesh nodes are introduced. Each flow runs at 500 kb/s with a packet size of 1000 bytes. Second, to create network failures, uniformly distributed channel faults are injected at a random time point. Random bit error is used to emulate channel-related link failures and lasts for a given failure period. Finally, all experiments are run for 3000 s, and the results of 10 runs are averaged unless specified otherwise.Combining ARS and BFS-CA i.e. ARSCA we got minimized control overhead. Control Overhead is considered in two terms 1) Route failure that takes new route so in this case traffic must be rerouted quickly and failure is recovered as per energy efficiency. 2) Broadcast Communication so that transmit broadcast even though all nodes are not awake and stay awake regardless of sleep schedule. These two terms we have satisfied and got 20% less overhead as compared to ARS and 40-50% less as that of BFSCA as shown in fig 1.3.





VI. CONCLUSION

Dynamic channel allocation for effective autonomous network reconfiguration system (ARS), by analyzing ARS, it shows that by using ARS alone it won't provide a sufficient result such as network quality, leader assigning problems etc, so in order improve the network performance we going to implement a new concept Breadth First Search Channel Assignment (BFS-CA) algorithm against with ARS so that it will multi radio configuration for mesh network and channel assignment problems.

VII. ACKNOWLEDGMENT

I would like to express my sincere gratitude towards my parents, my family and friends, for always being there with me. With all respect and gratitude, I would like to thank all the people, who have helped me directly or indirectly. Without their silent support and encouragement for this work could not have been possible

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