Resource Allocation and Multimedia Applications in Multi – Channel Wireless Networks

[1]Neema G, [2] S. Mahalakshmi
[1] Final Year Student, ME Communication Systems, [2.]Assistant Professor
EASA College of Engineering & Technology, Navakkarai-641115

***Abstract* - In mobile multimedia communication, new requirements are emerging based on the quality of service and energy efficiency. For the mobile multimedia applications in multichannel wireless networks, the energy and spectrum-efficient cooperative communication problem is studied by exploiting the benefits of cooperative communication. A mixed-integer nonlinear programming problem is formulated in the case of a static network. In order to solve this problem, linearization and reformulation techniques are employed which will transform it into a mixed integer nonlinear programming and is solved by using a branch and bound algorithm having enhanced performance. In dynamic networks, an online algorithm with low computational complexity and deployment overhead is employed. The proposed algorithm can improve the performance of energy efficiency in both static and dynamic networks**

***Index Terms* - Cooperative Communication, Energy Efficiency, Multichannel, Online Algorithm**

1. Introduction

The requirements and demands of multimedia applications are increased in the day to day life, e.g., usage of smart phones and tablets. Now it is quite common for all mobile users to share photos and videos with others. The usage of mobile games is also popular because they are portable and offer entertainment anywhere and anytime. Mobile multimedia applications introduce new requirements on the wireless networks like QOS, Energy Efficiency and Spectrum Efficiency. In modern wireless network, the demand growth of each applications imposes a main problem which is the scare utilization of spectrum.

The main aim is to reduce the total energy consumption in the multimedia communication. For this we have to identify the energy and spectrum efficient cooperative communication problem. It mainly described as a MINLP problem. The very next step is to solve this problem by converting it into a linear programming problem and this can be done by branch and bound algorithm. In the static networks an optimal algorithm is to be proposed. For dynamic network an online algorithm are proposed in order to decrease the energy consumption.

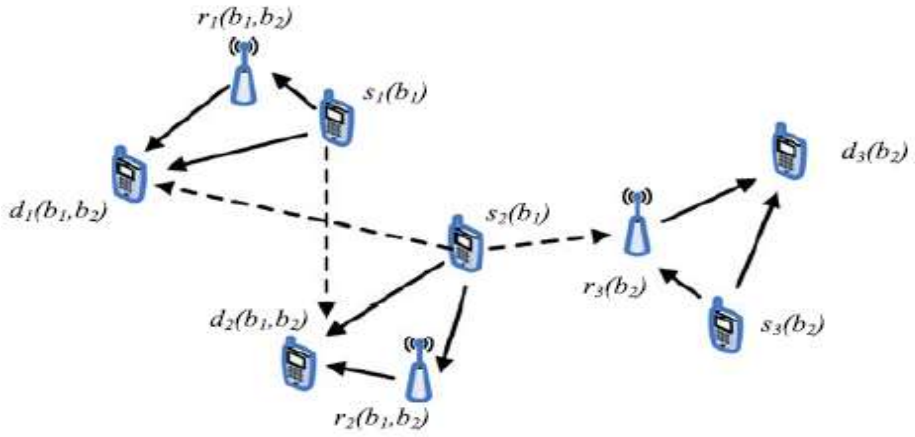

Fig 1 Network Model

Fig 1 Shows the network model of the work . It mainly consist of the source, destination and rely nodes. The source node sent the information to the destination node with a power and the rely node act as an intermediate between them.

2 Related Work

2.1. Cooperative Communications

In the cooperative communications lots of energy is wasted, in order to reduce the energy consumption in the CC an optimal power allocation is considered. By using the amplifier power and circuit power the energy consumption is optimized in CWSN. The optimal power allocation algorithm helps to identify the best rely node in order to use the multiple ones. The basic structure of the Cooperative Communications could be represented by using the three node model given in the Fig 1. In that source, destination and rely nodes represents s, d and r respectively. The transmissions are done according with a fixed bandwidth under a channel.

2.2. Branch and Bound Algorithm

In order to describe the ESCC problem, first formulate it as a MINLP problem and convert this into a MILP problem which can be removed by the branch and bound algorithm. Different characters are selected to enhance the algorithm. Branch and Bound Algorithm mainly deals with the integer variables in the ESCC problem. Branch and bound can be especially used for integer optimization problems which are not binary but it is easier to explain by using binary problems. It cannot give any guarantee for short computation time and that is depends on the degree of successful pruning which itself depends on the values and cost.

2.3. Online Algorithm

An online algorithm is mainly used in the dynamic networks. At any time the source and destination pair can join in the network and also can be leave from the network. An optimal global algorithm is used to handle the dynamic networks. The main objectives of the online algorithm which are used in the dynamic networks are Efficiency, Simplicity and Performance. It is having a low computational complexity so it can be able to respond as early as possible.

3 Proposed Model

In this work it proposes a method to improve the energy efficiency during the use of multimedia applications. Multi-hop Scheduling algorithm, Branch-and-Bound algorithm and an online algorithm are used in this work. More over a Power Adaptation Algorithm is used to improve the energy efficiency during the transmission. The proposed project has been developed in the Network Simulator Software. It just compared the output with already used algorithms. By using the power adaptation algorithm a small changes in the power consumption will occur compared with others.

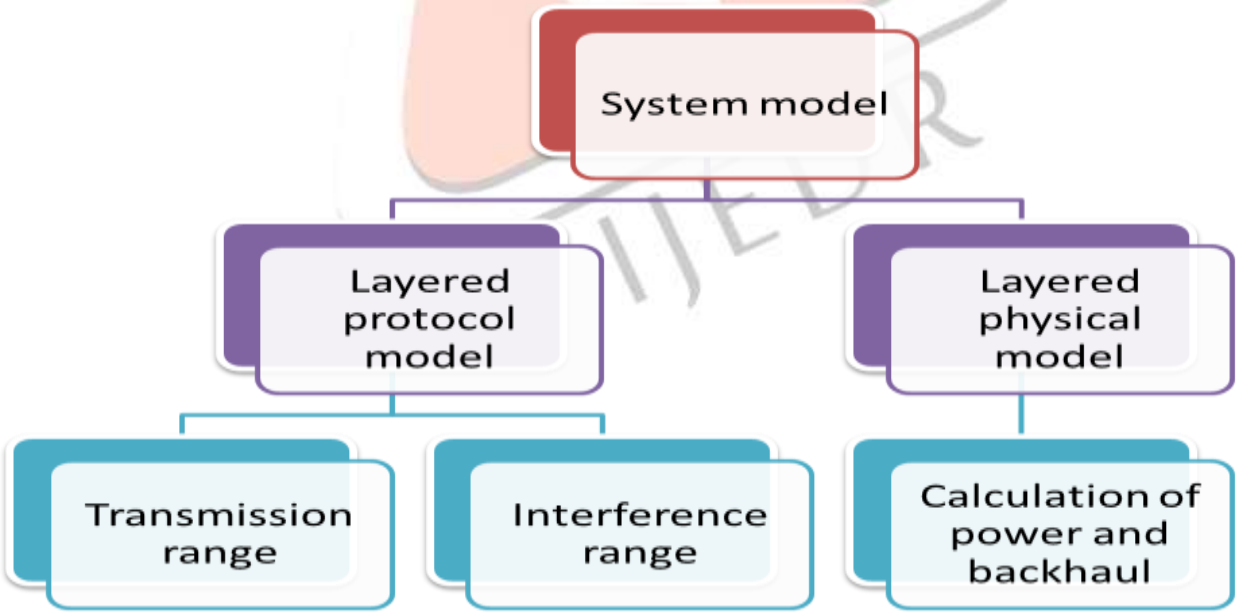

Fig 2 Block Diagram

Fig 2 represents the block diagram of the system model. The system model can be divided into two. Layered protocol model and layered physical model. The layered protocol model uses the transmission range as well as the interference range. The calculation of the power and the backhaul can be done by the layered physical mode in the system model. Layered protocol model is also called the M-Protocol model.

4 Simulation and Results

The simulation can be done in the Network Simulator (NS 2) software. It is an open source tool that runs on linux. In this 15 nodes are considered for the investigation. The communication between different types of nodes are noted all the nodes having a radius 250meters.

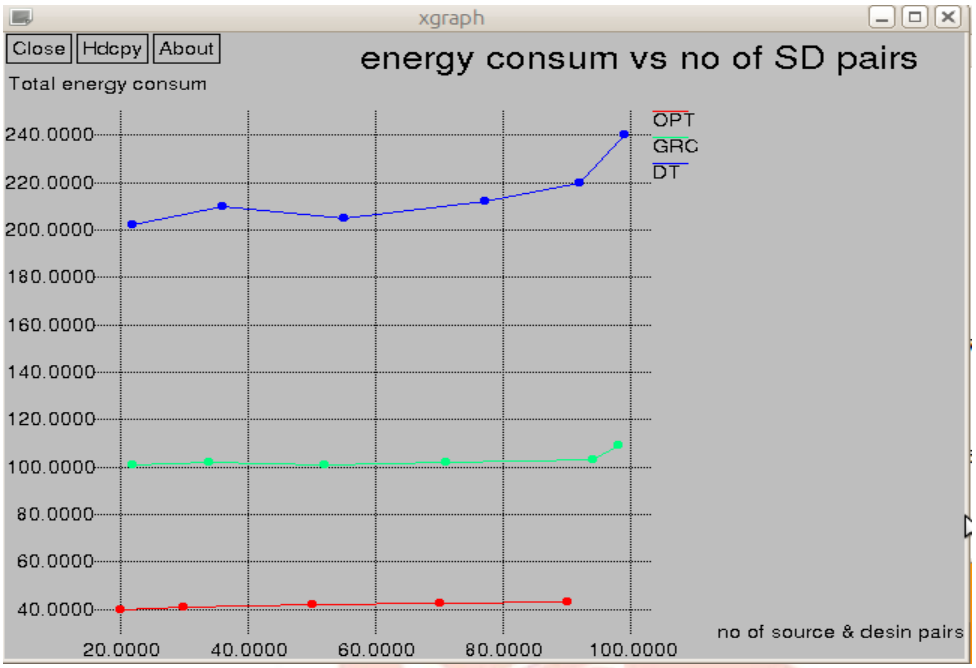

Fig 3 Energy Consumption vs no of SD pairs

Fig 3 shows the energy consumption versus number of Source-Destination pairs. The energy consumption grows as the number of S-D pairs increases for all.

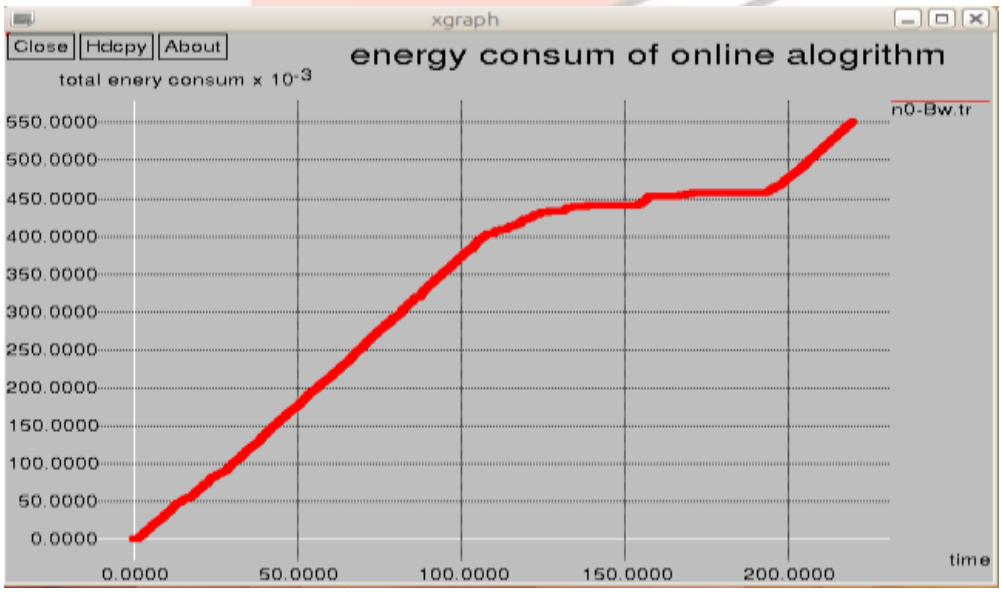

Fig 4 Energy Consumption of Online Algorithm

Fig 4 shows the energy consumption of Online Algorithm. Here we take 10 rely nodes and 10S-D pairs. We can identify that the energy consumption increases in this graph.

5 Conclusion

Different varities of algorithms were used to reduce the energy consumption in the mobile adhoc networks. As the requirements

increases the energy consumption also increases. In order to reduce the energy consumption in the networks, an onlne algorithm are used with low complexity in the dynamic networks.Different simulations are recorded in order to show that the energy consumption reduces comparatively with the others.

6 References

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