Utility Based Resource Allocation For QoS In Wireless Mesh Network

Charlse.M.Varghese, G.Saranraj

Abstract—**In this paper the proposal is to develop a framework to address the problem of maximizing the aggregate utility of traffic flows in a multi-hop wireless mesh network, with constraints imposed both due to self-interference and minimum rate requirements. The parameters that are tuned in order to maximize the utility are (i) transmission powers of individual nodes and (ii) the channels assigned to the different communication links. The framework is based on using a cross-decomposition technique that takes both inter-flow interference and self-interference into account. The output of the framework is a schedule that dictates what links are to be activated in each slot and the parameters associated with each of those links. If the minimum rate constraint cannot be satisfied for all of the flows, the framework intelligently rejects a sub-set of the flows and recomputes a schedule for the remaining flows.**

Index Terms— Data transmission, Channel assigning, Admission control, Reduce interferences.

I. INTRODUCTION

Resource allocation plays a very vital role in research community. QoS in Mobile Ad-Hoc Networks which is universally growing area. A mobile Ad hoc network is an autonomous system of mobile routers connected by wireless links. Ad hoc wireless networks are self-creating, self organizing, and self-administrating networks. Hence, they offer exclusive benefits and flexibility for a variety of situations and applications. Because of these features, the Ad hoc networks are used where wired network and mobile access is either blocked or not feasible. The need for resource allocation is very important in wireless networks, as the requirement of each source varies for different application. In telecommunication networks, QoS refers to several related aspects that allow the transport of traffic with special requirements. In order to guarantee the QoS in future wireless networks, it is desirable to implement certain resource allocation design mechanism to allocate the limited resource such as bandwidth, channel, and transmit power etc among all the users fairly and efficiently.

A framework for maximizing the aggregate utility of traffic sources while adhering to the capacity constraints of each link and the minimum rate requirements imposed by each of the sources. The framework takes into account the self-interference of flows and assigns channels, transmission power levels, and time slots to each link such that the above objective is achieved. It dictates the rates at which each traffic source will send packets such that the minimum rate requirements of all coexisting flows are met. The framework uses two methods. One is cross decomposition approach to overcome the problem due to self-interference of the packets. The framework is also extended to support admission control which handles where a new flow enter into the network without violating minimum rate requirements in the network. This cross decomposition approach compared with Utility based allocation to find the optimal solution.

II RELATED WORKS

The aggregate utility of traffic sources are maximizing while adhering to the capacity constraints of each link and the minimum rate requirements imposed by each of the sources. The framework takes into account the self-interference of flows and assigns channels, transmission power levels, and time slots to each link such that the above objective is achieved. It dictates the rates at which each traffic source will send packets such that the minimum rate requirements of all coexisting flows are met. The framework also extended to the allocation of bandwidth and channel quality for different types of QoS service. Cross Decomposition approach finds the solution for maximum utility function. To solve the maximum utility function scheduling problem is considered. Scheduling problem considers transmit power, channel assignment. Without transmit power no node can transfer data. Channel assignment is also important for the data transmission. While assigning channels, self-interference are considered, which arise due to the overlapping of packets in the same flow. Different from wired links that are having dedicated bandwidth, the bandwidth of a wireless link is shared between neighboring nodes. A flow through wireless links not only consumes the bandwidth of the nodes along its path, it also contends for bandwidth with the nodes that are in the neighboring area of its path. Such inter-flow interferencecan result in bandwidth starvation for some nodes since these nodes may always experience busy channels. To prevent such starvation, a routing metric must help routing protocols choose paths that can balance not only the traffic load along the path of a flow, but also reduce the inter-flow interference imposed in the entire neighboring area.

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A. Quality of Service

Quality of Service is a generic term collectively used to assess the usefulness of any system with user's perspective. In computer networks, QoS involves adding mechanisms to control the network activity such as transmission and error rates, to assure certain level of service parameters.

B. Issues of MANET

There are several issues for realization of benefits from Ad hoc networking. Some of these issues include mobility management, powermanagement, and quality of service is briefly elaborated here.

C Mobility Management

In Ad hoc networks the nodes move freely from one place to another place. The location of the nodes must be identified before the data is transferred from one node to another node and a connection needs to be established. There are many mobility management schemes defined to support real-time and non-real-time application in the global Internet, both for inter-domain and intra-domain mobility. Mobility management deals with storage, maintenance, and retrieval of the mobile host location information.

C. Power Consumption

As wireless devices usually rely on portable power sources such as batteries to provide the necessary power, power management in wireless networks has become a crucial issue. It has been observed that energy is not always consumed by active communication in Ad hoc networks. Energy consumed by wireless devices in the idle state is comparatively less than that in the transmitting or receiving states.

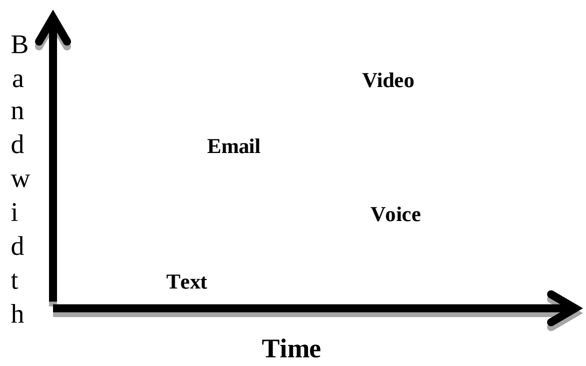


Fig.1 shows the Traffic behavior and QoS requirement for different applications vary also from one application to another application for Electronic Mail, File Transfer and Remote Terminal Telnet the bandwidth requirement is low, since the data is transferred in the form of small batch files. In HTML web browsing, the bandwidth requirement varies, since the data is transferred in a series of burst files. Video, voice streaming tends to have low tolerances for packet loss and medium tolerances for delay and jitter. Typical acceptable response times are in the order of a few seconds, because of the well known fact that the server can pre-buffer multimedia data on the client to a certain degree. This buffer then drains at a constant rate on the client side, while simultaneously, receiving bursty streaming data from the server with variations in delay.

Algorithm 1 Channel Assignment

1: sort all links by descending order of their transmission charge.

2: choose a link for transmissions on the basis of the QoS.

3: check whether there is any active link on the nodes in the selected path.

4: Check if there is active incident link then move

5: Then avoid selected path.

6: end if

7: choose another path for operation purpose.

8: goto next 2

Algorithm 2 Admission Control

1: initialize the value E–>0, F–>0. Do it

2: add the existing links in E .

3: De-active links in F check

4: User requested path in E

5: Reject the request

6: end if

6: else

7: Then the requested path is in F.

8: Admit requested analysis

9: end else if

III. METHOD DESCRIPTION

A. Cross decomposition module

In the former cross decomposition module all the connection between the nodes in the networks can be viewed. The user initially selects a source and destination node for some links in network to be in active state. Connection is established between source and destination node by direct or indirect way. The user can view all the active and de-active links in the current network.

B. Channel Assignment

In channel assignment module some paths are displayed. The user can select any path according to the QoS requirement for the transmission of data. The path will be displayed along with the transmit power. Each node will be having some transmit power. The path contain several nodes so the transmit power displayed along the path will be average transmit power of all the nodes in the path. The user can reschedule power if the allocated power is not enough for the transmission of data. The updating must not exceed the upper limit of transmit power in each node.

C. Admission control

Admission control module avoids congestion due to the self interference. This module avoids the path which is already in active state. The selection of the already active path makes delay or packet loss. To avoid this admission control strategy warns the user that the selected path is already in active state. The user can select another path for transmission. Through the selected path data will be transferred to the destination.

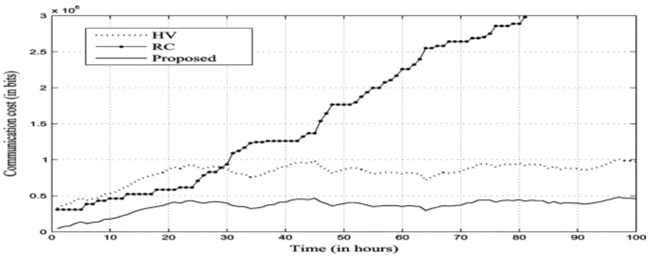
D. Utility based allocation

Utility based allocation method allocates the resources like bandwidth and channel quality. The user can select bandwidth and channel quality according to the QoS requirement of their application. The server will allocate a path corresponding to the selected resources. Through the allocated path data will be transferred to the corresponding destination.

Analysis

In the analysis module comparison of cross decomposition method and utility based allocation approach is compared in terms of resource used and time taken for the transfer of data.

IV. SYSTEM ARCHITECTURE



V.

Fig.2 shows the total communication cost that the sender or the storage node needs to send on a membership change in each multiauthority CP-ABE scheme. It includes the ciphertext and rekeying messages for nonrevoked users. It is measured in bits.In this simulation, the total number of users in the network is realize the fine-grained key revocation for each attribute group.Therefore, we can observe that there is a tradeoff between computational overhead and granularity of access control, which is closely related to the windows of vulnerability. However, the computation cost for encryption by a sender and decryption by a user are more efficient compared to the other multiauthority schemes.

V. CONCLUSION

The framework maximizes the aggregate utility of flows taking into account constraints that arise due to self-interference and minimum rate requirements of sources. The proposed framework readily leads to a simple and effective admission control mechanism. There is a theoretically computing performance bounds with our network, with a network having soft QoSbehaviour. Another method utility based allocation is also designed which calculates the utility of flow based on bandwidth and channel quality. Comparison of utilization of resource is also performed. It has been seen that cross decomposition method can be used for the transmission of less latency sensitive application that is for soft QoS application.

VI. REFERENCES

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