Efficient Channel Allocation in Wireless Mesh Network

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Abstract-Efficiently allocating the channels in a network considering various factors like bandwidth, number of data packets, priority of packets etc is becoming a challenging task. A static network is used here to reduce the delay and to send the data packets more efficiently to the destination. To find the optimum path among the paths available, we have proposed a system improvising some performance factors. Also considerable shortest paths are chosen by specific algorithm. And finally the channels are allocated to the corresponding packets so that the residual bandwidth is more and the delay is lesser. The channel allocation scheme handled here is Fixed Channel Allocation. In FCA, there are problems like it is less efficient in handling peer-to-peer traffic. Thus the task to allocate the channels without the degradation of performance factors here becomes more challenging and the new proposed system helps us to allocate the channels efficiently.

Key Words: Channel allocation, efficiency, FCA

I. INTRODUCTION

Wireless Mesh Network:

Wireless communication is without doubt a very desirable device as emphasized with the tremendous growth in both cellular and wireless local area networks (WLANs) (primarily the ones that are compliant with the IEEE 802.11 family of standards, popularly known as Wi-Fi. The cellular networks offer wide area coverage, but the service is relatively expensive and offer low data rates: even the third generation of cellular networks (3G) offer (at best) low data rates (2Mbps) compared to WLANs(>50 Mbps for IEEE 802.11a and 802.11g and 100 Mbps for proprietary solutions at the time of this writing).On the other hand, the WLANs have rather limited coverage(and the associated reduced mobility). Wireless metropolitan area networks (WMANs) (e.g., the family of IEEE 802.16 standards), partially bridges this gap, offering high data rates with guaranteed quality of service to a potentially large customer base (up to tens of miles from the base station).
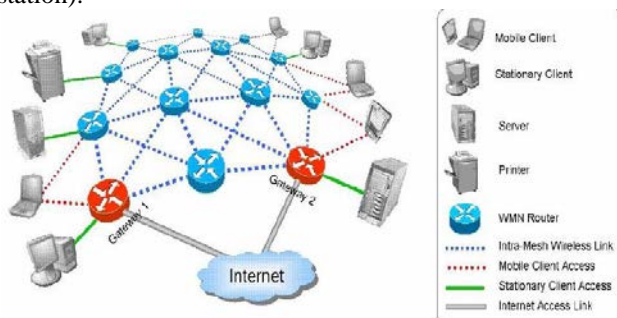

Figure 1.1 WMN Architecture

In communities with a high density of obstructions (high-rise buildings or 12 trees), more than half of the customers cannot be served due to the LOS requirement. Furthermore, the base stations tend to be complex and expensive. Wireless mesh networks (WMNs) have the potential to eliminate many of these disadvantages by offering low cost, wireless broadband Internet access both for fixed and mobile users.

The main drawback of WMN is their complexity: it is relatively easy to design and build a line of products that will form a WMN and will forward packets to and from the destinations; however it is very difficult to achieve optimum (or near-optimum) performance of this network while ensuring security and robustness. In challenges, will present many of the problems that have to be solved in order to produce a high-performance, secure and reliable WMN.

A.CHANNEL ALLOCATION SCHEMES AND SURVEY

The channel allocation schemes are:

1. Fixed: FCA, fixed channel allocation: Manually assigned by the network operator
2. Dynamic:
3. DCA, dynamic channel allocation,
4. DFS, dynamic frequency selection
5. Spread spectrum, Hybrid

Channel assignment may achieve much higher throughput than traditional channel assignment, when opportunistic routing technique is provided. The source node of a session divides its traffic into a number of batches, where each batch consists of B packets [1].When the MAC is ready to send, the source node generates a random linear combination of the packets in the current batch and broadcasts the coded packet. Each coded packet has a packet header containing sufficient information for routing [2].

The destination uses the contents of its received packets to decide whether it has sufficient information for decoding [3].Random network coding is a simple yet powerful encoding scheme, which in broadcast transmission schemes allows close to optimal throughput using a decentralized algorithm. Nodes transmit random linear combinations of th packets they receive, with coefficients chosen from a Galois field [4].

II. EFFICIENT CHANNEL ALLOCATION

The approach is to allocate the channels efficiently based on the parameters like bandwidth of the channel, number of data packets etc.

1) VIDEO COMPRESSION

Raw video must be compressed before transmission to achieve efficiency. Video compression schemes can be classified into two categories: scalable and non scalable video coding.

2) CONTINUOUS MEDIA DISTRIBUTION SERVICES

In order to provide quality multimedia presentations, adequate network support is crucial. This is because network support can reduce transport delay and packet loss ratio. Continuous media distribution services include network filtering, application-level multicast and content replication.

3) STREAMING SERVERS

To offer quality services, streaming servers are required to process multimedia data under timing constraints and support interactive control operations such as pause/resume, fast forward and fast backward

4) MEDIA SYNCHRONIZATION MECHANISMS

Media synchronization is a major feature that distinguishes multimedia applications from other traditional data applications. With media synchronization mechanisms, the application at the receiver side can present various media streams in the same way as they were originally captured.

5) PROTOCOLS FOR STREAMING MEDIA

Protocols are designed and standardized for communication between clients and streaming servers. Protocols for streaming media provide such service as network addressing, transport and session control. Thus the shortest distance is calculated and the minimum path is found out. If a crash occurs in the minimum path, the next minimum path is found to transmit the information.

6) ENCODING AND DECODING

The process of encoding and decoding where information is encoded and decoded for the security of data.
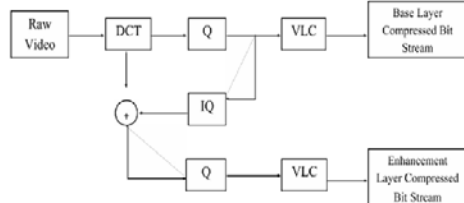

Figure2.a) Encoders and Decoders

7) SNR SCALABLE ENCODER AND DECODER

SNR Scalable Encoder and Decoder where the SVC standardizes the encoding and decoding of a high quality video bit stream.
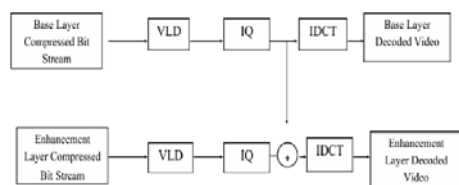

Figure2.b) SNR Scalable Encoder and Decoder

8) SCALABLE ENCODING AND DECODING

One of the compressed sub streams is the base sub stream, which can be independently decoded and provide coarse visual quality. Other compressed sub streams are enhancement sub streams, which can only be decoded together with the base sub stream and can provide better visual quality. The complete bit-stream (i.e., combination of all sub streams) provides the highest quality.

9) BASIC FLOW DIAGRAM OF PROPOSED SYSTEM

The proposed architecture where the packet is granted request to update the list and transfer each block of packet. When the last block in a packet is transmitted, the packet is granted permission for transmission when there is less traffic in the network and the bandwidth consumption is less. The list is updated accordingly while the packet is transmitted. When the last block of the packet is transmitted, we disseminate the allocation. Hence the channel allocation is done more efficiently.
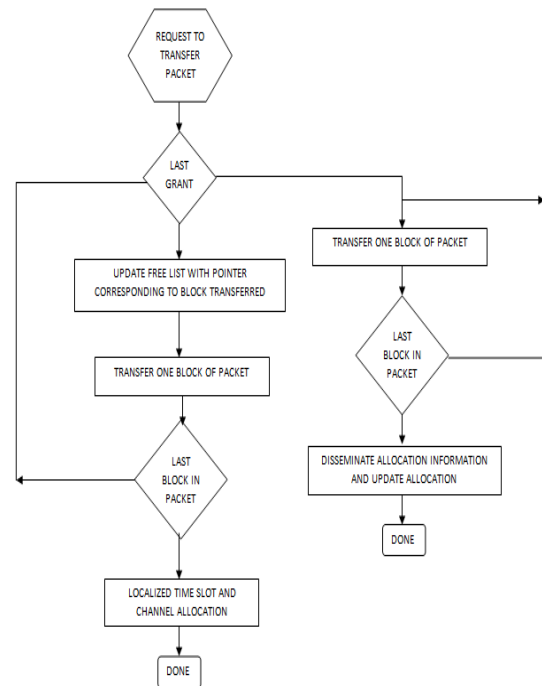

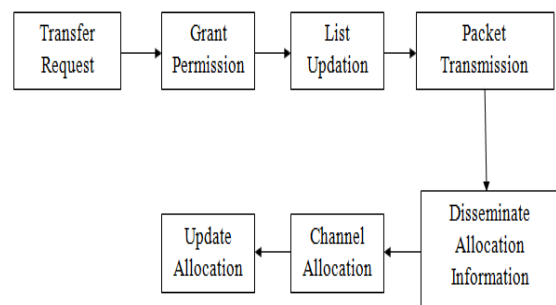**Figure2.c)** Flow Diagram For Efficient Channel Allocation

Figure2.d) Packet Transmission and Channel Allocation Process

PROPOSED ALGORITHM

1) A mesh network is constructed and packets are transmitted between various nodes.

2) Channel Allocation: A sending node broadcasts message to notify its neighbours that it is a sending node if Queue length for the receiving node<Threshold.

3) If the receiving channel is not negotiating with any sending node and if the channel bandwidth is sufficient for the message sent, then channel is allocated for the corresponding packet.

4) If the last block in a packet is transmitted, DISSEMINATE ALLOCATION.

5) Update the list with pointer corresponding to each packet transfer.

6) The performance of parameters like residual bandwidth is improved with considerable delay.

7) A receiving node broadcasts messages to notify that it is a receiving node if Queue length for sending node<Threshold

8) If the priority of call is more, the corresponding packet is transmitted.
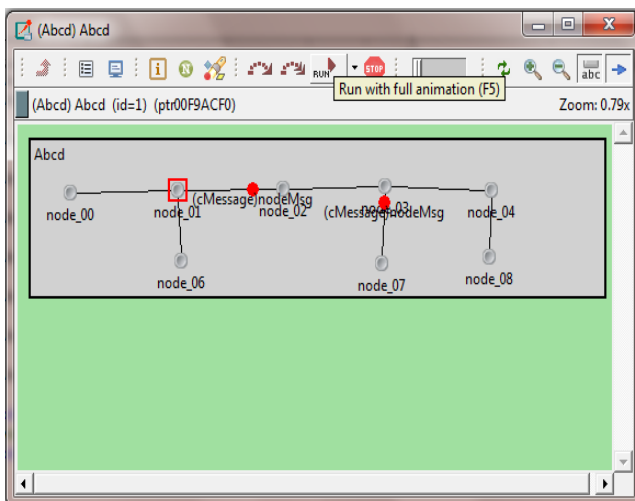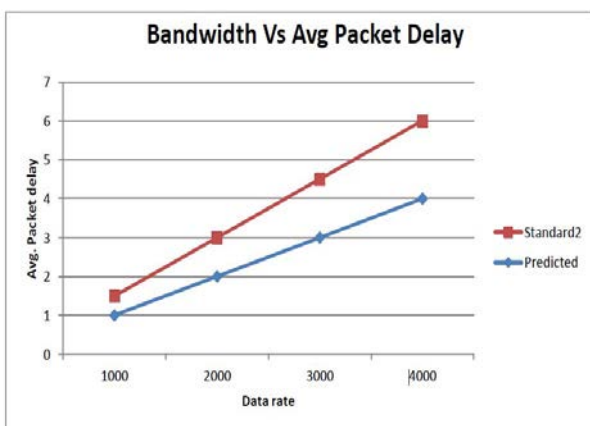

The network in which channel allocation is done

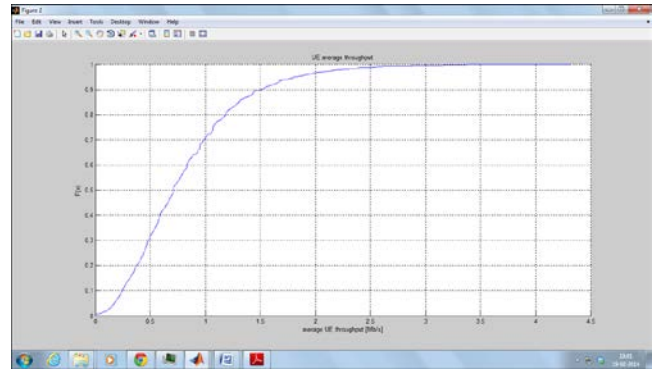**Figure2.e** Comparison of packet delay against bandwidth

Figure2.f Simulation statistics

III. CONCLUSION

Thus the channel allocation is done considering the shortest distance (Dijkstra's Algorithm), the bandwidth of the channel, the number of packets transmitted and the priority of calls with improved throughput. The Routing concept is clearly studied. The delay is reduced and some performance factors are improvised. The base paper algorithm drawbacks are clearly found out and rectified with the new proposed algorithm. Thus a new algorithm is proposed and implemented to obtain a higher performance.

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