Congestion Aware Load Balancing for Multiradio Wireless Mesh Network

A.C.Kumar, E.Dhlipkumar

[1]PG Student, [2]Associate Professor

1, 2, Department of MCA, Dhanalakshmi Srinivasan College of Engineering and Technology

Abstract:

A new kind of wireless multi-hop network architecture called Wireless Mesh Network (WMN) has recently attracted much attention. In this paper, we propose congestion aware multipath routing protocol called EAOMDV-LB for multiradio multiple interface wireless mesh networks (WMN). The protocol calculates multiple paths using proposed airtime congestion aware (ACA) metric and performs load balancing by computing queue utilization of multiple interfaces of a node. Moreover, the effective load balancing technique maintains data transmission on optimal path by diverting traffic all the way through congested area. WMNs have recently gained a lot of popularity due to their rapid deployment, instant communication capabilities and support for many types of application. For these applications, network congestion is the main reason for lower throughput and longer delay. Most of the present routing protocols for WMN's are not designed to adapt congestion and optimal link quality. The simulation results using ns2 reveal that our proposed load balancing scheme performs better than AOMDV in terms of throughput, end-to end delay with high traffic density.

Keyword :- **Wireless Mesh Network; multiple interfaces and multiple channels; airtime link cost metric; round trip time;congestion; load balancing.**

1. INTRODUCTION

In the last decade many advances have been made in the area of digital media, and much concern has arisen regarding steganography for digital media. Steganography [1] a singular method of information hiding techniques. It embeds messages into a host medium in order to conceal secret messages so as not to arouse suspicion by an eavesdropper [2]. A typical steganographic

application includes covert communications between two parties whose existence is unknown to a possible attacker and whose success depends on detecting the existence of this communication [3]. In general, the host medium used in steganography includes meaningful digital media such as digital image, text, audio, video, 3D model [4], etc. A large number of image steganographic algorithms have been investigated with the increasing popularity and use of digital images [5], [6].

Most image steganographic algorithms adopt an existing image as a cover medium. The expense of embedding secret messages into this cover image is the image distortion encountered in the stego image. This leads to two drawbacks. First, since the size of the cover image is fixed, the more secret messages which are embedded allow for more image distortion. Consequently, a compromise must be reached between the embedding capacity and the image quality which results in the limited capacity provided in any specific cover image. Recall that image steganalysis is an approach used to detect secret messages hidden in the stego image. A stego image contains some distortion, and regardless of how minute it is, this will interfere with the natural features of the cover image. This leads to the second drawback because it is still possible that an image steganalytic algorithm can defeat the image steganography and thus reveal that a hidden message is being conveyed in a stego image.

In this paper, we propose a novel approach for steganography using reversible texture synthesis. A texture synthesis process re-samples a small texture image drawn by an artist or captured in a photograph in order to synthesize a new texture image with a similar local appearance and arbitrary size. We weave the texture synthesis process into steganography concealing secret messages as well as the source texture. In particular, in contrast to using an existing cover image to hide messages, our algorithm conceals the source texture image and embeds secret messages through the process of texture synthesis. This allows us to extract the secret messages and the source texture from a stego synthetic texture. To the best of our knowledge, steganography taking advantage of the reversibility has ever been presented within the literature of texture synthesis.

Our approach offers three advantages. First, since the texture synthesis can synthesize an arbitrary size of texture images, the embedding capacity which our scheme offers is proportional to the size of the stego texture image. Secondly, a steganalytic algorithm is not likely to defeat this steganographic approach since the stego texture image is composed of a source texture rather than by modifying the existing image contents. Third, the reversible capability inherited from our scheme provides functionality to recover the source texture. Since the recovered source texture is exactly the same as the original source texture, it can be employed to proceed onto the second round of secret messages for steganography if needed. Experimental results have verified that our proposed algorithm can provide various numbers of embedding capacities, produce visually plausible texture images, and recover the source texture. Theoreticalanalysis indicates that there is an insignificant probability of breaking down our steganographic approach, and the scheme can resist an RS steganalysis attack [7].

1. LITERATURE SURVEY

Literature survey is the most important step in software development process. Before developing the tool it is necessary to determine the time factor, economy n company strength. Once these things r satisfied, ten next steps is to determine which operating system and language can be used for developing the tool. Once the programmers start building the tool the programmers need lot of external support. This support can be obtained from senior programmers, from book or from websites. Before building the system the above consideration r taken into account for developing the proposed system.

2. PROPOSED SYSTEM

Congestion aware route discovery is proposed for Mobile Adhoc network (MANET) where optimal routing path is selected based minimum queue size of the node.

In this section, we have proposed Airtime Congestion Aware (ACA) routing metric with efficient load balancing scheme that maintains nodes' transmission on optimal path and improve the efficiency of wireless mesh network.

We also have computed queue utilization of multiple interfaces on each node to avoid highly loaded nodes. We detail the proposed metric and load balancing scheme as follows.
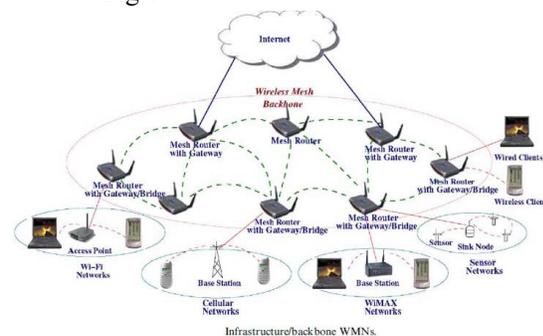
Fig 1.

Fig 1. Overall System Architecture

4.RESULTS

This section presents the results and discussion of our proposed effective load balancing scheme with airtime congestion aware (ACA) metric for infrastructure wireless mesh network. In this scenario, we have kept all nodes static.
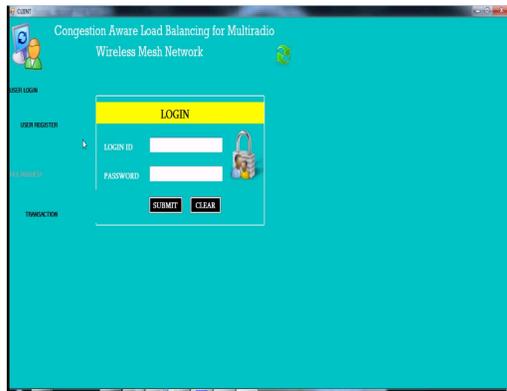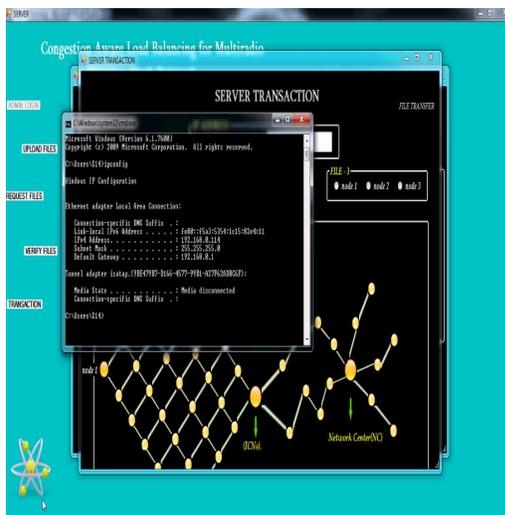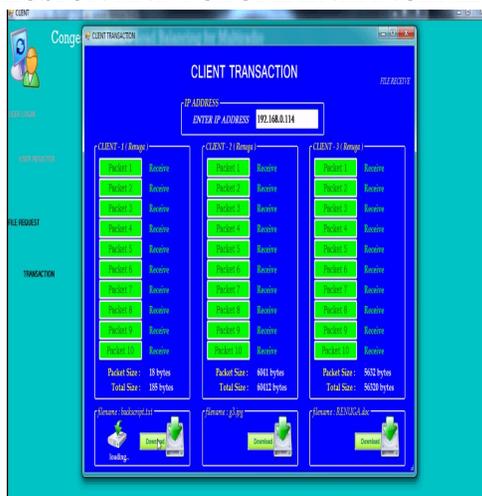
Figure 4.1

Figure 4.2

Figure 4.3
CONCLUSION AND FUTURE ENHANCEMENT

Multi-radio wireless mesh networks have a great potentialm for a wide range of applications. But, the routing protocols need to find a least congested multiple paths using better routing metric and perform load balancing by utilizing all network resources optimally. In this paper, we proposed EAOMDV-LB routing protocol which calculates multiple paths using ACA metric and perform load balancing using queue utilization information of multiple interfaces of a node. The proposed technique maintains nodes' transmission on optimal path and improves the efficiency of network. The performance evaluation of AOMDV and EAOMDV-LB routing protocols is carried out using a NS-2 for static scenarios. The simulation results indicate that proposed protocol exhibits a better performance in highly loaded situations with regard to throughput and end-to-end delay.

As a future work, we plan to design a new load aware routing metric to find multiple paths by considering the interference of multiple radios and design a new mechanism for load balancing. We also plan to compare and analyzed proposed routing metric with other routing metrics.

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