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QoS-Aware Routing Based on Bandwidth Estimation for Mobile Ad Hoc Networks

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ABSTRACT

Routing techniques for mobile networks (MANETs) have been extensively researched in recent years. Most of these tasks involve finding the most feasible route from source to destination without considering existing network traffic or application requirements. Therefore, the network can be easily overloaded with too much traffic and there is no way to apply to improve its performance in terms of network traffic. This may be acceptable for data transfer, but many real-time applications require quality of service (QoS) support in the network. We believe that QoS support can be achieved by finding a route that meets the application's requirements or by providing network feedback to the application if the requirements cannot be met. We propose a QoS-aware routing protocol that integrates an access control scheme and a feedback scheme to meet the QoS requirements of real-time applications. What's new about this QoS-aware routing protocol is that it uses bandwidth estimates to react to network traffic. Our approach implements this concept by using two bandwidth estimation methods to find the remaining bandwidth available to each node to support new flows. It models a QoS-compliant routing protocol for nodes handling IEEE 802.11 medium access control. Experimental results show that compared

with routing protocols that do not support QoS, the packet delivery ratio is significantly increased, packet delay and capacity loss are significantly reduced, but not the end-to-end implementation.

Index Terms : router, mobile network (MANET), quality of service (QoS) intelligent routing..

INTRODUCTION

The nonvirtuous nature of mobile ad hoc networks (MANETs) has attracted the attention of the researc h community. By successfully solving complex but critical problems at all network layers, people will r ealize that MANETs have commercial value. Many of the applications that are currently popular for us e in mobile networks (eg, video conferencing, live movies on the Internet, instant messaging) also hav e implications for MANETs. However, adhoc netw orks present unique technical challenges, including protocol design for mobility management, efficient routing, data transmission, security, power manage ment, and quality of service (QoS) provision. Once these issues are resolved, MANET can be used. De signing solutions for all these problems is currently very difficult Providing QoS is good for many applications because you can change the data you send. For example, many video coding techniques, such as MPEG-4[3], H. 263[4], and multi-technology coding[5], have been designed to accommodate different channel conditions. QoS-aware routing protocols provide feedback to applications about current network conditions, allowing them to properly adjust the degree of compression applied to the video. Without this information, the video may not be fully compressed, causing network problems and dropping many packets. This is much worse than streaming video at a low data rate. Some applications require very little bandwidth support. If the minimum bandwidth is not met, all data will be wasted. Therefore, we recommend that you do not send data in this case. Because it just wastes bandwidth and network power. Therefore, to solve this problem, integrated control schemes are also designed with QoS-compliant routing protocols..

EXISTING SYSTEM

Several routing systems have been developed to automate the protocol of AODV in the existed methods.

Another challenge in QoS is the design of the medium access control (MAC) layer. We argue that IEEE 802.11 MAC is not the best MAC to support QoS. However, it is widely used in the wireless local area network (WLAN) communit y, and many devices have been marketed with I EEE 802.11. Therefore, in our design, we choo se the IEEE 802.11 standard as the base MAC l ayer. IEEE 802.11 does not support fixed, delay ed, etc. bitrate streams. Therefore, our intention here is to develop a QoScompliant routing prot ocol using IEEE 802.11 that provides better ser vices for video and audio applications..

PROPOSED SYSTEM

Therefore, we propose a QoS-aware routing protocol, which is based on residual bandwidth estimation during route set up. Our QoS-aware routing protocol is built off AODV, in which the routing table is used to forward packets, “Hello” messages are used to detect broken routes and “Error” messages are used to inform upstream hosts about a broken route. We explore two ways to perform bandwidth estimation, and we incorporate both an adaptive feedback-based scheme and an admission control scheme.

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DATA FLOW DIAGRAM

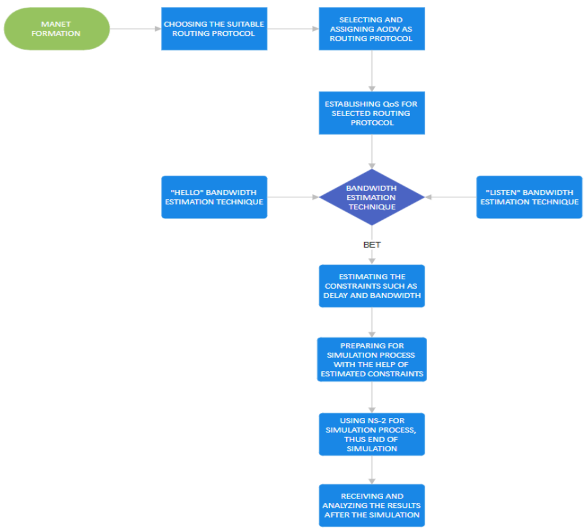


Figure 1: Data Flow Diagram

The above figure represents the dataflow diagram of our project.

DATA FLOW EXPLANATION

The provided block diagram illustrates the key components and flow of interactions in a proposed system for the QoS Aware routing protocol based on bandwidth estimation technique.

MANET FORMATION:

The process starts with forming a network structure called MANET. MANETs are kind of wireless ad-hoc networks that usually has a routable networking environment on top of link layer ad hoc network. The work plan is to form a feasible and fastest route for the specified routing protocol.

AODV ROUTING PROTOCOL:

The next Important step is that using of selected routing protocol that is AODV (Ad-hoc On – Demand Distance Vector). This AODV routing protocol ensures the RREQ (Route Request) and RREP (Route Reply) packet communication across the MANET network.

QoS AWARE ROUTING:

QoS (Quality Of Service) Routing is actually a constraint based routing protocol. It is mainly used in our routing protocol for finding end- to-end path to satisfy the QoS constraint. In our MANET we have chosen delay and bandwidth as QoS constraints.

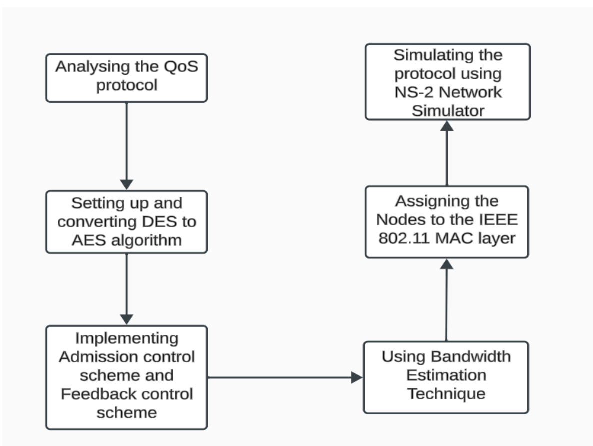
BANDWIDTH ESTIMATION:

To offer a QoS- Guaranteed MANET network, The given bandwidth must be estimated from end- to- end that is from source to destination. This will be done by two new techniques that is HELLO and LISTEN bandwidth estimation technique.

SIMULATION PROCESS:

The environment used here for the simulation process is known as NS-2 (Network Simulator-2). It is used because, NS-2 is primarily local and wide area networks, thus it is easy for simulation purposes.

DATASET FLOW STRUCTURE

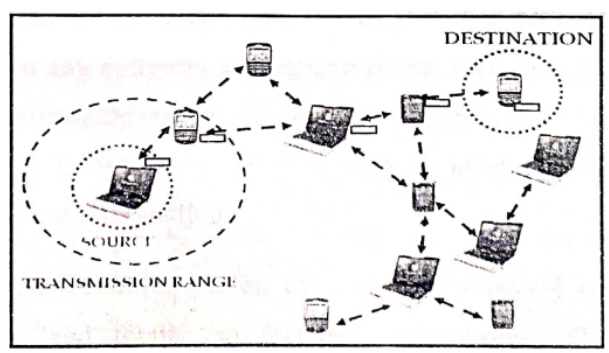


The goal of the QoS- Aware protocol is to provide Quality Of service support that can be achieved by either finding a route to satisfy the real time application requirements or offering network feedback to the application when the requirements cannot be met. The importance of the QoS- Aware protocol in achieving the full potential of enhanced and secured communication. This also ensures faster communication and avoids end to end delays.

QoS AWARE ROUTING:

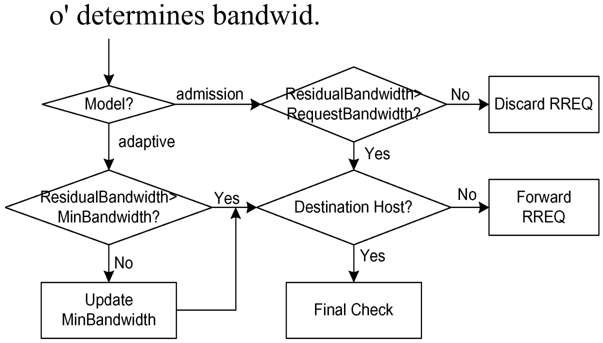
QoS is a contract to provide guaranteed ser vices to users, including bandwidth, latenc y, delay, and packet delivery speed. Suppor ting more than one QoS constraint makes t he QoS routing problem NPcomplete [11]. Therefore, when studying QoS-compliant r outing to support real-time audio or video s treaming, we consider bandwidth limitatio ns. We consider a QoS-compliant routing p rotocol that provides feedback on available bandwidth requests (responsive approach) or can flow with the requested bandwidth (inbound approach). The return and acknow ledgment methods require you to know the end-to-end bandwidth available along the p ath from source to destination. Bandwidth estimation is therefore the main focus of Q oS support.

Our work explores different methods for es timating available bandwidth, including int roducing QoScompliant schemes for locati ng and responding to requests using an inte ractive design.



BANDWIDTH ESTIMATION:

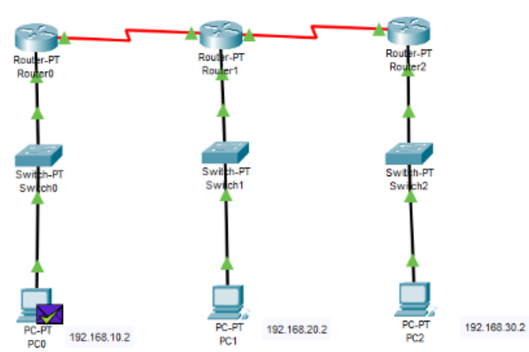
Providing guaranteed QoS bandwidth requires knowing the end-to-end location along the path from source to destination. The end-to-end out put is a concave parameter [12] and is determin ed by the bottleneck width of the intermediate f orces along the path. Therefore, the end-to-end estimate can be refined to find the minimum re maining bandwidth available between the hosts on that path. However, how to calculate the re maining bandwidth using IEEE 802.11 MAC is still a difficult problem. This is because bandw idth is shared between neighboring hosts, and i ndividual hosts have no knowledge of the traffi c status of other neighboring hosts. In this articl e, there are two methods to estimate bandwidth. One is for the host to listen to the channel and determine the available bandwidth based on the ratio of free time to busy time ("earned" bandw idth determination). Another is to have all hosts report the bandwidth they are currently using i n their "Hello" messages and have the host esti mate its available bandwidth based on the band width consumption specified in the "Hello" me ssages of both hosts hosts. Neighbor hop ('Hell o' determines bandwid.



TECHNIQUES USED:

To estimate available bandwidth, intelligently, each host can listen to a channel to track the traffic situa tion and determine how much free bandwidth is av ailable per second. IEEE 802.11 MAC uses physica l and virtual carrier detection (via Network Assign ment Vector (NAV)), which can be used to determi ne idle and busy times.

It is easy to use the "gain" method to estimate the remaining bandwidth. However, with this approach, the host cannot release bandwidth when the path is lost. Because we don't know how much bandwidth each node on the broken path consumes. "Receive" only calculates the bandwidth used and does not vary in cost per stream. This has a significant impact on the accuracy of bandwidth estimation when paths are broken. So we introduced "Thanks" bandwidth resolution, another way to better allocate available bandwidth when pathbreak.



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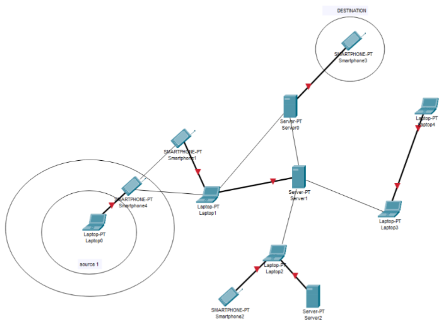
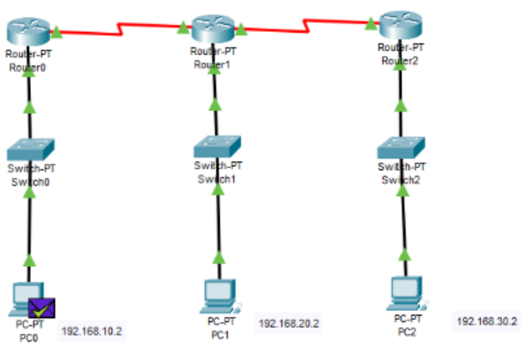
PROPOSED MODEL DEMOS:

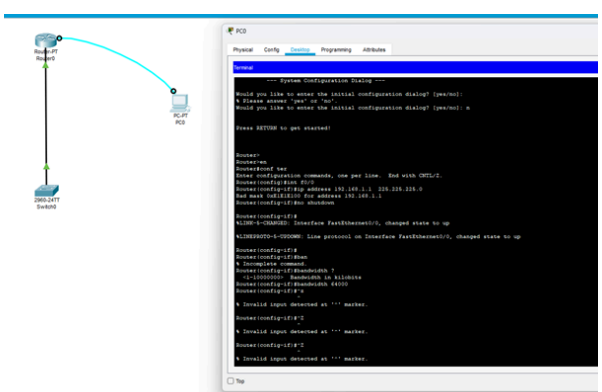
1. **MANET**



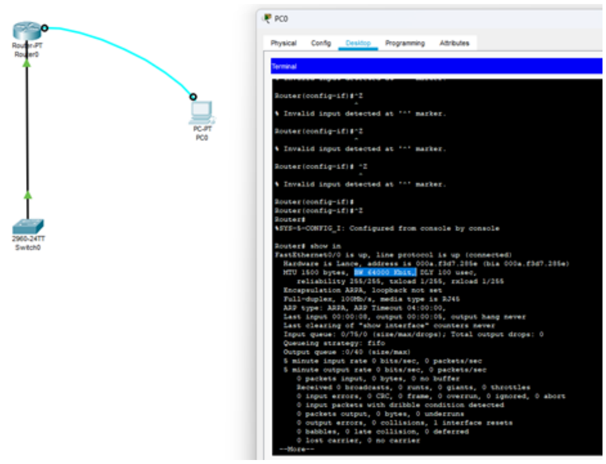
2. **IMPLEMENTATION ROUTING PROTOCOL**



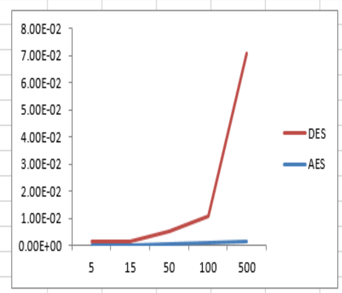
3. **BANDWIDTH ESTIMATION**



4. **ASSIGNING BANDWIDTH**



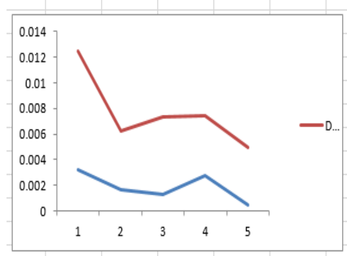
5. **AES VS DES ALGORITHMS IN MINS**



AES VS DES IN MINS

	AES	DES
5	3.95E-05	0.001229
15	9.74E-05	0.001346
50	0.00028	0.00474
100	0.000777	0.009919
500	0.001424	0.069404

6. **IMPLEMENTATION OF NODES IN AES**



	AES	DES
1	0.0032	0.0093
2	0.0016	0.0046
3	0.0013	0.006
4	0.0027	0.0047
5	0.0004	0.0045

CONCLUSION:

In this paper, we propose to introduce QoS into routing and introduce bandwidth estimation by broadcasting bandwidth information through "Hello" messages. It implements a cross-platform approach, including an adaptive response scheme and an acknowledgment scheme to inform applications about network status. Simulations show that QoS-aware routing protocols can improve packet delivery ratios without affecting end-to-end performance and significantly reduce packet latency and energy consumption. We proposed two different methods to estimate the bandwidth. In cases where fast bandwidth delivery is important, the "Hello" bandwidth estimation method performs better than the "Listen" bandwidth estimation method. The Hello and Listen methods work well in static topologies by using large weights to reduce congestion and reduce the loss of false positive Hello messages. broken paths In wired topologies, "Tena" has better end-to-end performance and "Listen" has better performance in terms of packet delivery ratio. From the above perspective, "Listen" adds no overhead, but "Hello" adds overhead by adding information about neighbors' bandwidth usage to the "Please Live" message..significantly impact healthcare practices, fostering more accurate and efficient diagnoses for improved patient outcomes.

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