QOD Enabled AOMDV Protocol for Hybrid Wireless Networks

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Abstract - **A mobile ad hoc network is an autonomous collection of mobile devices like laptops, smart phones, sensors that communicate with one another wirelessly and in a distributed manner to provide the required network practicality in the absence of a fixed infrastructure. As wireless communication gains quality, vital analysis has been dedicated to support real-time transmission with rigorous Quality of Service (QoS) necessities for wireless applications. Ad hoc On Demand Multipath Distance Vector (AOMDV) protocol was designed primarily for extremely dynamic ad hoc networks wherever link failures and route breaks occur often. It maintains routes for destinations in active communication and uses sequence numbers to determine the freshness of routing information to prevent routing loops. It's a timer-based protocol and provides the simplest way for mobile nodes to retort to link breaks and topology modification. QoS-Oriented Distributed routing incorporates five algorithmic programs particularly QoS-guaranteed neighbour choice algorithm to fulfill the transmission delay demand, a distributed packet programming algorithmic program to additional scale-back transmission delay, a quality-based section resizing algorithmic program that adaptively adjusts section size in line with node mobility so as to scale back transmission time, a traffic redundant elimination algorithmic program to extend the transmission throughput, and information redundancy elimination-based transmission algorithmic program to eliminate the redundant information to additional improve the transmission QoS. The projected approach, totally analyses the results of packet dropping nodes on the network. Analysis of the QoS parameters of the network is analyzed for two cases: one with Link failure, signal drop and interference and another in the presence of packet dropping nodes and perform recovery solutions. Analyzing the network with these five algorithms before implementing AOMDV protocol provides higher QoS so enhancing AOMDV protocol.**

Index Terms— Wireless Communication , AOMDV, QoS, Ad hoc network.

I. INTRODUCTION

A mobile ad hoc network is an random collection of mobile devices such as laptops, smart phones, sensors that communicate with each other over wireless links and cooperate in a distributed manner in order to provide the necessary network functionality in the absence of a fixed infrastructure. This type of network operates as a stand-alone network or with one or multiple points of attachment to cellular networks or the internet. It paves the way for numerous new and exciting applications. A mobile ad hoc network (MANET) consists of mobile hosts equipped with wireless communication devices. The transmission of a mobile host is received by all hosts inside its transmission range as a result of the broadcast nature of wireless communication and omni-directional antennae. If two wireless hosts are out of their transmission ranges in the ad hoc networks, alternative mobile hosts placed between them will forward their messages which effectively build connected networks among the mobile hosts within the deployed space. Due to the mobility of wireless hosts, every host has to be equipped with the potential of an autonomous system. Ad hoc network could be a dynamic multi-hop wireless network that is established by a group of mobile nodes on a shared wireless channel. Every mobile host performs native broadcasts so as to spot its existence to the encompassing hosts. The widespread use of wireless and mobile devices and also the increasing demand for mobile multimedia system streaming services are resulting in a promising close to future where wireless transmission services (e.g., mobile vice, online TV, and on-line conferences) are wide deployed. The emergence and also the unreal envisioned real time and multimedia system applications have excited the requirement of top quality of Service (QoS) support in wireless and mobile networking environments. The QoS support reduces end-to-end transmission delay and enhances throughput to guarantee the seamless communication between mobile devices and wireless infrastructures. At the same time, hybrid wireless networks (i.e., multihop cellular networks) are established to be a more robust network structure for consecutive generation wireless networks and may facilitate to tackle the tight end-to-end QoS needs of various applications [1]. Hybrid networks synergistically mix infrastructure networks and MANETs to leverage one another.

II. QUALITY OF SERVICE

Quality of service (QoS) refers to a network's ability to attain most information measure and agitate different network

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performance components like latency, error rate and time period [4]. Quality of service additionally involves dominant and managing network resources by setting priorities for specific forms of information (video, audio, files) on the network. QoS is completely applied to network traffic generated for video on demand, IPTV, VoIP, streaming media, videoconferencing and on-line gaming. Quality of service contains necessities on all the aspects of a association, like service latent period, loss, ratio, crosstalk, echo, interrupts, frequency response, loudness levels, and so on A communications network forms the backbone of any self-made organization [3]. These networks transport a large number of applications and information, as well as high-quality video and delay-sensitive information like real-time voice. The bandwidth-intensive applications stretch network capabilities and resources, however additionally complement, add value, and enhance each business method. Networks should give secure, certain, measurable, and typically warranted services. Achieving the desired Quality of Service (QoS) by managing the delay, delay variation (jitter), bandwidth, and packet loss parameters on a network becomes the key to a self-made end-to-end business resolution. Thus, QoS is that the set of techniques to manage network resources.

A.PROBLEM WHILE PROVIDING QoS

Mobile ad hoc networks differ from the traditional wired networks. The unique characteristics are dynamically varying network topology, lack of precise state information, shared radio channel, limited resource availability, hidden terminal problem and insecure medium. Security may be thought of as a QoS attribute. Without adequate security, unauthorized accesses and usages might violate the QoS negotiations. The character of broadcasts in wireless networks probably ends up in additional security exposures. The physical medium of communication is inherently insecure. Thus we'd like to style security-aware routing algorithms for ad hoc networks.

III. PROPOSED WORK

There are variety of protocols offered to enhance the QoS parameters in wireless mobile networks by removing the nodes that consume and waste resources. QoS routing needs not solely to find a route from a source to a destination, but a route that satisfies the end- to-end QoS demand, usually given in terms of information measure or delay. Totally different mac layers have different necessities for successful transmissions, and a QoS routing protocol developed for one variety of mac layer doesn't generalize to others simply. Delivering end-to-end service quality in mobile ad hoc networks is intrinsically joined to the performance of the routing protocol as a result of new routes or various routes between source-destination pairs need to be sporadically computed throughout on-going sessions. Most of the approaches address a specific layer in OSI stack. However, there's no elaborated analysis over the results of packet dropping nodes on the network. In proposed system the focus is on QOS-oriented distributed routing algorithms (QOD) to enhance AOMDV protocol for QOS support capability of hybrid networks. Hybrid wireless network help to tackle the stringent end to end QOS requirement for different applications.

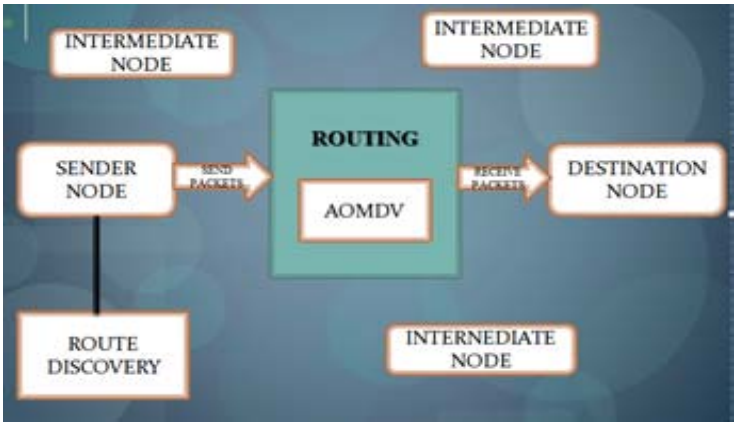

Fig 1. AOMDV Routing

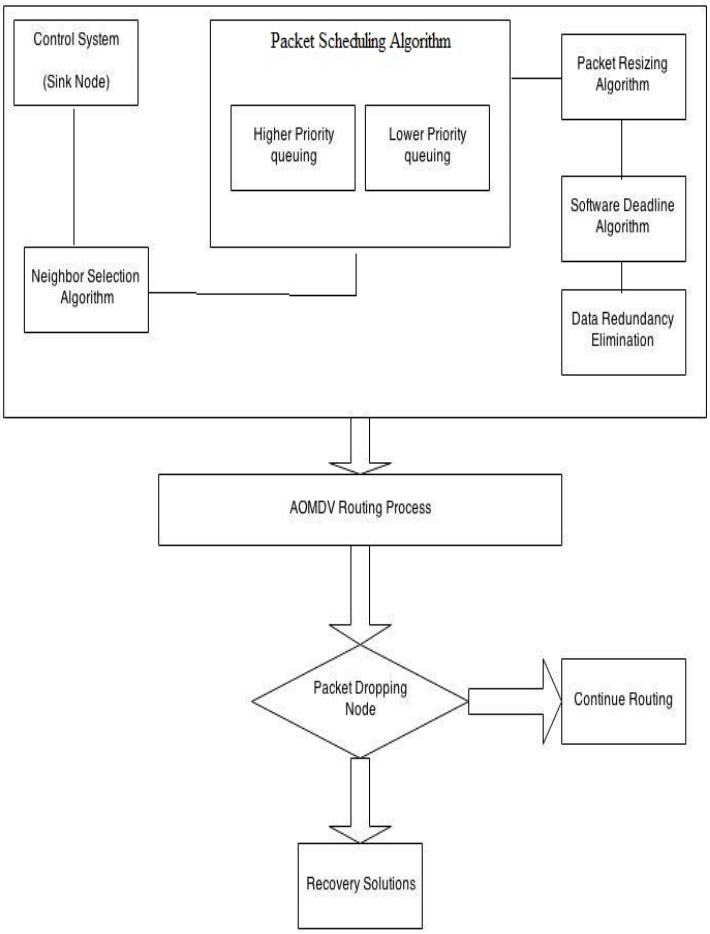

Fig 2 .Proposed Work

AOMDV was designed primarily for extremely dynamic ad hoc networks wherever link and route failures occur often. It maintains routes for destinations for communication and uses sequence numbers to determine the integrity of routing information to prevent loops. It's a timer-based protocol and provides a easy way for mobile nodes to restore to link breaks and topology changes. QoS-Oriented Distributed routing incorporates five algorithmic programs particularly QoS-guaranteed neighbor choice algorithm to fulfill the transmission delay demand, a distributed packet programing algorithmic program to additional scale-back transmission delay, a quality-based section resizing algorithmic program that adaptively adjusts section size in line with node mobility so as to scale back transmission time, a traffic redundant elimination algorithmic program to extend the transmission throughput, and information redundancy elimination-based transmission algorithmic program to eliminate the redundant information to additional improve the transmission QoS. The projected approach, totally analyses the results of packet dropping nodes on the network. Analysis of the QoS parameters of the network is analyzed for two cases: one with Link failure, signal drop and interference and another in the presence of packet dropping nodes and perform recovery solutions. Analyzing the network with these five algorithms before implementing AOMDV protocol provides higher QoS so enhancing AOMDV protocol.

A. QOS METRICS

In this project, we will analyses the following QoS parameters for wireless ad-hoc networks:

a. delay : it must be low
b. end-end delay : it must be low
c. throughput: it must be high
d. energy: it must be low
e. packet delivery ratio: it must be high
f. route cost: it must be low

B.PROTOCOL DESCRIPTION

Ad hoc On Demand Multipath Distance Vector Routing (AOMDV) is based on a prominent on-demand single path protocol known as ad hoc on-demand distance vector (AODV). AOMDV extends the concepts of AODV protocol to discover multiple paths between the source and the destination in every route discovery process. Multiple paths so computed are guaranteed to be loop-free and disjoint. AOMDV has three features compared to other on-demand multipath protocols [5]. First, it does not have high inter-nodal coordination overheads like some other protocols (e.g., TORA , ROAM). Second, it ensures disjointness of alternate routes via distributed computation without the use of source routing [7]. Finally, AOMDV computes alternate paths with minimal additional overhead over AODV; it does this by exploiting already available alternate path routing information as much as possible.

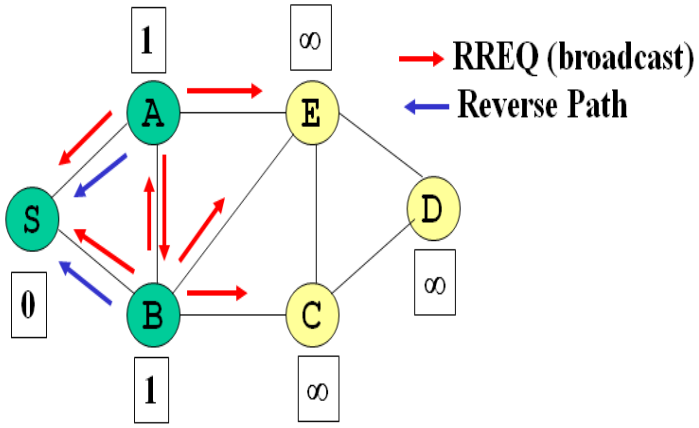

Fig 3 Reverse Path identification

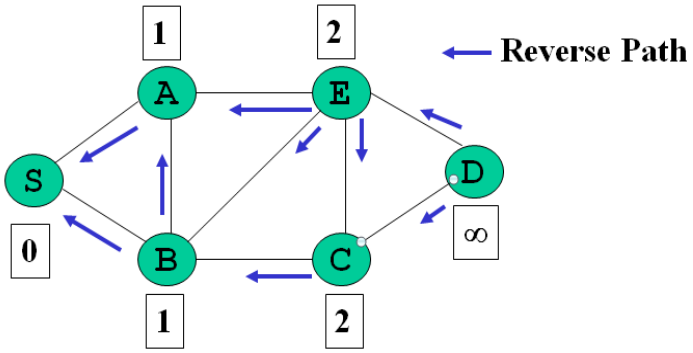

Fig 4. Multiple Loop-Free Reverse Path

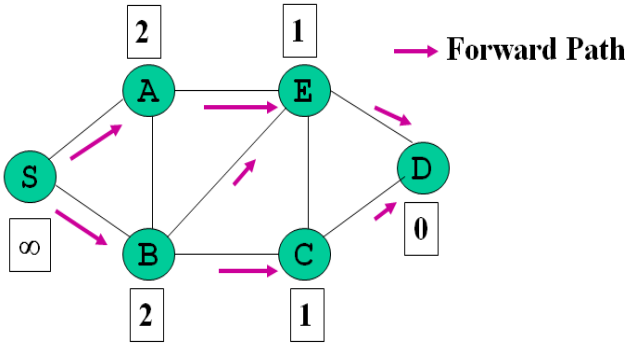

Fig 5. Multiple Loop-Free Forward path

IV. SIMULATION

We used Network Simulator -2(NS-2.35) for the simulation. Network simulation software enables us to predict the behavior of large-scale and complex network systems. NS2 is a discrete event simulator. The simulation parameters are listed in the table below:

Terrain	900x900
MAC	MAC 802.11
Channel	Wireless Channel
Propagation	TwoRayGround
Number of Nodes	50
CBR	350 Secs
Interface Queue Type	Droptail/Priority Queue
Interface Queue Length	1000
Protocol	AOMDV
Antenna	Onmi-Directional

Table 1.1 Simulation Parameters

V. RESULTS AND OUTPUT

The result is verified by using the performance analyses of the QoS metrics such as throughput, packet delivery ratio and delay. These metrics are recorded for both AOMDV and QOD enabled AMODV and then comparison is made.

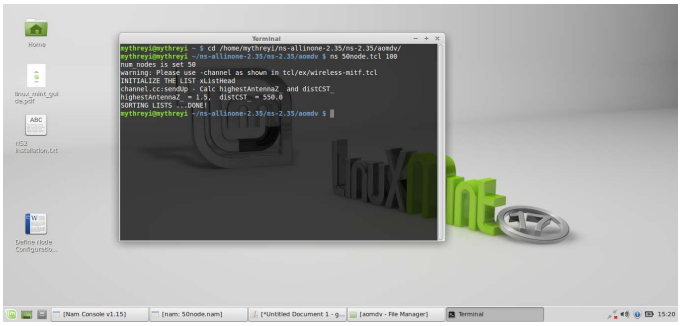

Fig 6. Running TCL Script for AOMDV Protocol

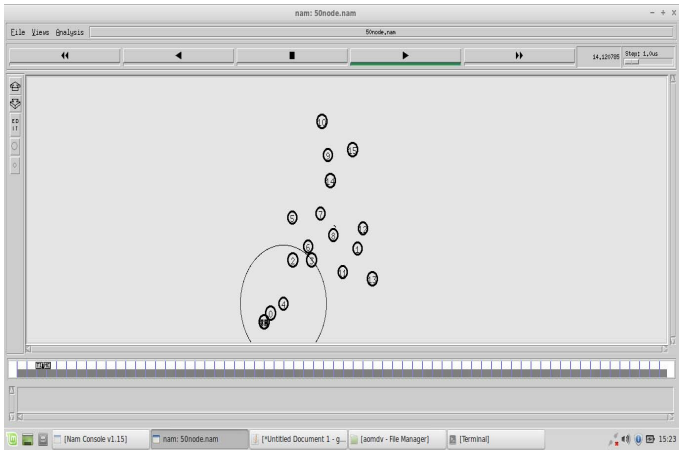

Fig 7.QOD Enabled AOMDV Routing

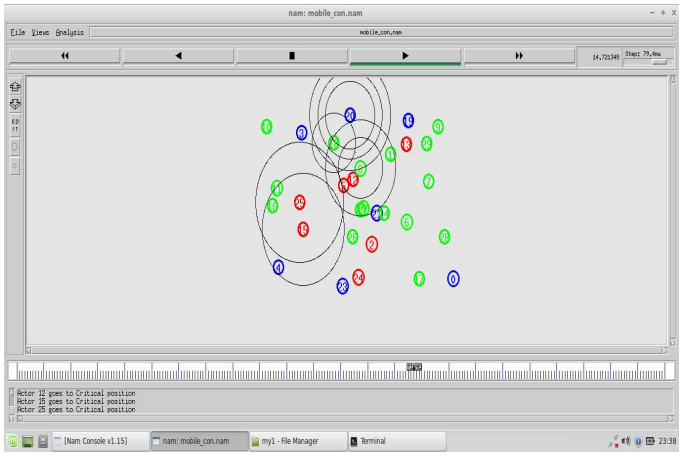

Fig 8.QOD Enabled AOMDV with Critical Node Identification

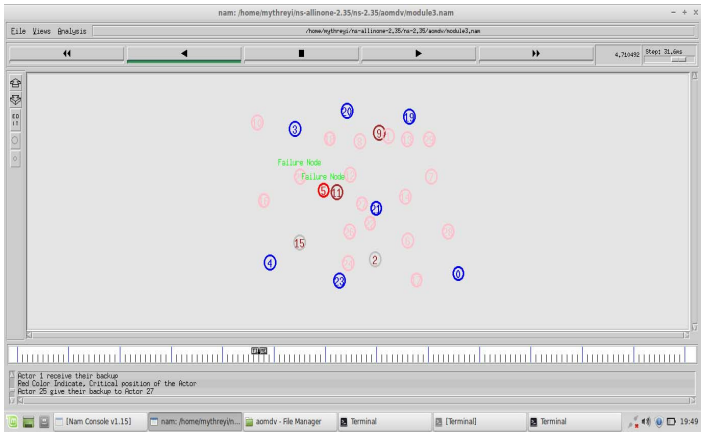

Fig .9 QOD Enabled AOMDV Protocol with Backup Recovery

A. Performance Analysis

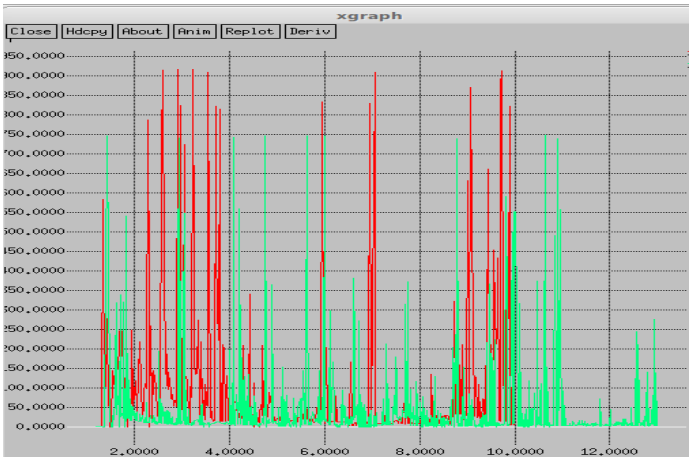

Fig 10.Throughput

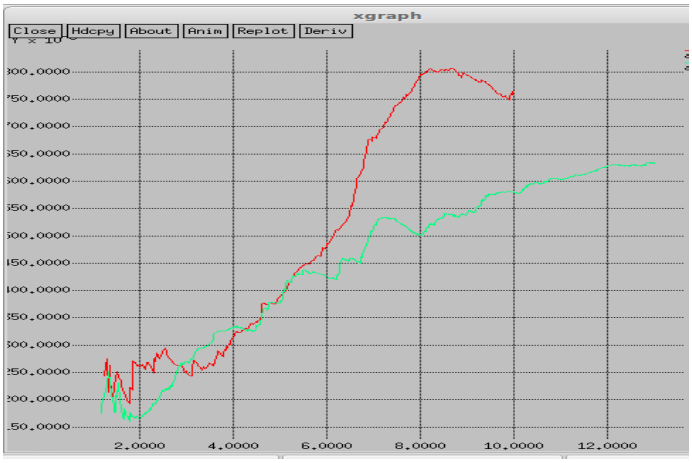

Fig 13. Average End-To-End Delay

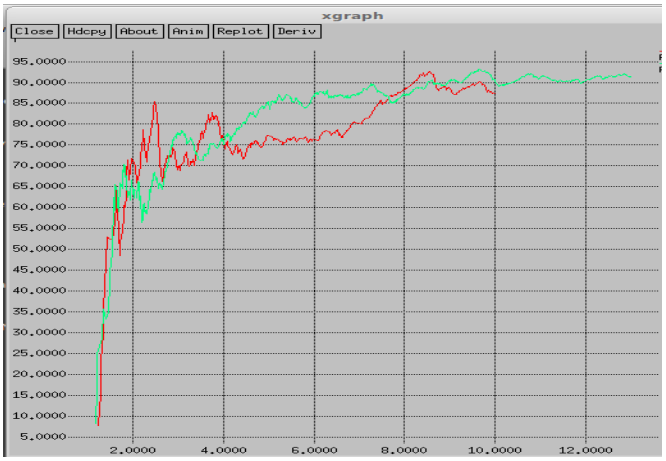

Fig 11. Packet Delivery ratio

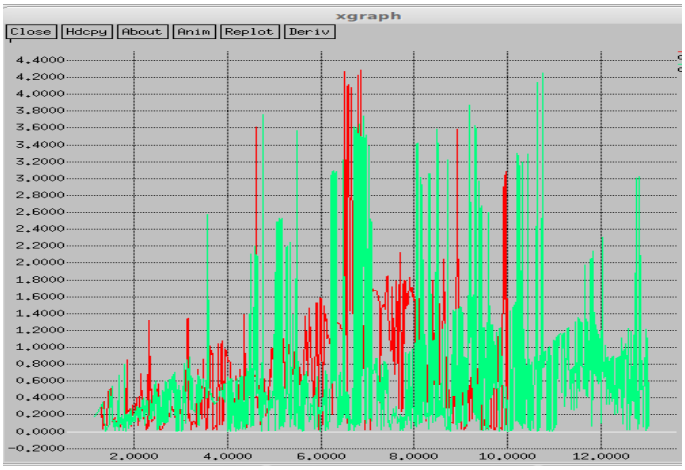

Fig 12. Delay

VI .CONCLUSION AND FUTURE WORK

Hybrid wireless networks paves way for the next-generation network applications. This QOD enabled AOMDV can also be incorporated into sensor network applications where QoS plays vital role. From the performance analysis shown above we can see that the throughput and packet delivery ratio is improved than normal AOMDV routing and also delay and average end-to-end delay is minimum. As a part of real-time implementation this can be used in military applications where QoS is required more importantly. This will be the focus of future enhancement. Also when using sensors energy constraint can be considered as sensors lifetime can be increased if it is energy efficient.

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