IPHV8I1022X
International Journal Of Advanced Research and Innovation -Vol.8, Issue .I
ISSN Online: 2319 – 9253
Print: 2319 – 9245

QOS ORIENTED ROUTING BASED ON MULTINODES FOR HYBRID WIRELESS NETWORKS

[#1]NARLA RAMYASREE, M.Tech Student,
[#2]B.RAMESH, Assistant Professor,
Dept of CSE,
SREE CHAITANYA INSTITUTE OF TECHNOLOGICAL SCIENCES, KARIMNAGAR, T.S., INDIA.

Abstract: QoS routing is an important research issue in MANET, especially for mission-critical monitoring and surveillance systems which requires timely and reliable data delivery. As wireless communication gains popularity, significant research has been concerned to supporting real-time communication with stringent Quality of Service (QoS) requirements for wireless applications. At the same time, the wireless hybrid networks that accommodates a Mobile Ad hoc Network (MANET) and a wireless infrastructure network has been proven to be a better alternative for the next generation wireless networks. By directly taking resource reservation-based QoS routing for MANETs, hybrids networks derive invalid reservation and race condition problems in MANETs. The QoS-Oriented Distributed routing protocol (QOD) to enhance the QoS support capability of hybrid networks. QOD alter the packet routing problem to a resource scheduling problem. In this paper, we propose a QoS-Oriented Distributed routing protocol (QOD) to enhance the QoS support capability of hybrid networks. Taking advantage of fewer transmission hops and anycast transmission features of the hybrid networks, QOD transforms the packet routing problem to a resource scheduling problem. QOD incorporates five algorithms: 1) a QoS-guaranteed neighbor selection algorithm to meet the transmission delay requirement, 2) a distributed packet scheduling algorithm to further reduce transmission delay, 3) a mobility-based segment resizing algorithm that adaptively adjusts segment size according to node mobility in order to reduce transmission time, 4) a traffic redundant elimination algorithm to increase the transmission throughput, and 5) a data redundancy elimination-based transmission algorithm to eliminate the redundant data to further improve the transmission QoS.

Keywords: Mobile Networks, Cellular Networks, Node Free Routing Algorithms, Quality of Service.

I.INTRODUCITON

A Mobile Ad Hoc Network is a self-configuring infrastructure fewer networks of mobile devices connected by wireless. Each device in MANET is free to move independently in any direction and will therefore change its links to other devices frequently. Each must transmit traffic unrelated to its own use, and therefore be a router. The initial challenge in building a MANET is equipping each device to continuously maintain the information required to properly route traffic. Civilian applications include peer-to-peer computing and file sharing, collaborated computing in a conference hall, and search and rescue operations. An ad hoc wireless network is a collection of wireless mobile nodes forming a temporary network. Its classical applications are in battlefield communications, disaster recovery, and search and rescue operations. More commercial applications are already being developed. In an ad hoc wireless network, connections among these mobile nodes occur via multi-hop wireless connections without the support from a fixed infrastructure such as a base station. As technology advances, wireless and portable computers and devices are becoming more powerful and capable. These advances are marked by an improves in Memory size, CPU speed, disk space, and a decrease in size and power consumptions. The need for these devices to periodically communicate with each other and with wired networks is becoming increasingly essential. Mobile ad hoc networks (MANETs) open the door for these devices to provides networks on the fly, i.e., formally, a MANET is a group of mobile devices which form a communication network with no pre-existing wiring or infrastructure. It allows to the applications running on these wireless devices to share data of different types and functions. There are many applications of MANETs, each with separate characteristics of network size (geographic range and number of nodes), node mobility, communication requirements, and data characteristics. Recent progresses in the network technologies have led to rapid development of new wireless networking techniques and possibilities. An example of such a new wireless network is Mobile Ad hoc Network. On the other hand, the demand for new applications with new requirements is developed. One of the most demanding applications is multimedia application. Multimedia application characterized with the -requirements for voice and video conferencing, and text and images sharing. These new requirements have led to necessity of supporting real-time traffic. Real-time applications are highly sensitive to latency and other quality of service parameters such as bandwidth. Ad hoc networks have numerous practical applications such as military and emergency operations. These practical applications need the support of one to many, and many to many connections. Therefore, in such practical applications, multicast communication is a must. QoS routing, especially QoS multicast routing, is very crucial for these applications. QOD incorporates five algorithms: 1) Neighbor selection algorithm to meet the transmission delay requirement, 2)Distributed packet scheduling algorithm to further reduce transmission delay, 3) Mobility-based segment resizing algorithm to adaptively adjusts segment size according to node mobility in order to reduce transmission time, 4)Traffic redundant elimination algorithm to increase the transmission throughput, and 5)Data redundancy elimination algorithm to eliminate the redundant data to further improve the transmission QoS.

II. PROBLEM DEFINITION

The problem in the existing system is defined in the terms of reliable data delivery of data transmission in highly dynamic mobile hybrid networks [20]. Continuously changing network topology makes conventional wireless routing protocols incapable of providing satisfactory performance in the data transaction environment. In the face of frequent link break because of the node mobility, major data packets would either get lost, or knowledge long latency before reinstatement of connectivity. In Dynamic network topology the problems were

• Frequent link break
• Latency and Data loss
• High mobility

Hybrid wireless network topologies usually expose high link density. Low-end commodity switches are commonly used in most HWNs designs for economic and scalability considerations.

Mobile destinations (nodes) create a challenging problem for QOS protocols. Several protocols dealt the above problem by applying region based throughput and delay [21-22]. But those systems failed to deal with the high mobility in HWN environment.

III. NETWORK AND SERVICE MODELS

We consider a hybrid wireless network with an arbitrary number of base stations spreading over the network. N mobile nodes are moving around in network. Each node ni ($1 \le i \le N$) uses IEEE 802.11 interface with the Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA) protocol [28]. Since a hybrid network where nodes are equipped with multi interfaces that transmit packets through multichannels generate much less interference than a hybrid network where nodes are equipped with a single Wi-Fi interface, we assume that each node is equipped with a single Wi-Fi interface in order to deal with a more difficult problem. Therefore, the base stations considered in this paper are access points (APs). The Wi-Fi interface enables nodes to communicate with both APs and mobile nodes. For example, in a University campus, normally only buildings have APs. Therefore, people that do not have Wi-Fi access but close to buildings can use two-hop relay transmissions to connect to the APs in the buildings. Feeney et al. [29] considered the similar scenario in his work.

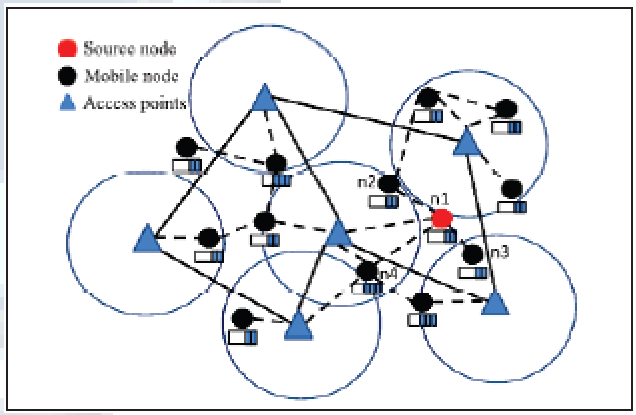

Fig. 1: Hybrid Wireless Network Model

The QoS requirements mainly include end-to-end delay bound, which is essential for many applications with stringent real-time requirement. While throughput guarantee is also important, it is automatically guaranteed by bounding the transmission delay for a certain amount of packets [31]. The source node conducts admission control to check whether there are enough resources to satisfy the requirements of QoS of the packet stream. For example, when a source node n1 wants to upload files to an Internet server through APs, it can choose to send packets to the APs directly by itself or require its neighbor nodes n2, n3, or n4 to assist the packet transmission. We assume that queuing occurs only at the output ports of the mobile nodes [32]. After a mobile node generates the packets, it first tries to transmit the packets to its nearby APs that can guarantee the QoS requirements. If it fails (e.g., out of the transmission range of APs or in a hot/dead spot), it relies on its neighbors that can guarantee the QoS requirements for relaying packets to APs.

IV.NEED FOR QOS

QoS considerations

Quality of Service (QoS) refers to a set of mechanisms able to share fairly various resources offered by the network to each application as needed, to provide, if possible, to every application the desired quality (the network's ability to provide a service). The QoS is considered to have a certain number of parameters (throughput, latency, jitter and loss, etc.) and can be defined as the degree of user satisfaction. QoS model architecture is designed to provide the possible best service. The model must handle all the constraints and challenges imposed by Ad-hoc networks, like network topology change due to the mobility of its nodes, constraints of reliability and energy consumption, so it describes a set of services that allow users to select a number of safeguards (guarantees) that govern such properties as time, reliability, etc. [5][6]. Classical models like Intserv / RSVP [7] and DiffServ [8] proposed in first wired network types are not suitable (adapted) for MANETs which requires node negotiation, admission control, resource reservation, and priority scheduling of packets [9]. However it is more difficult to assure QoS in MANETs due to unique features like user mobility, channel variance errors, and limited bandwidth. As a result, attempts to directly take in the QoS solutions for infrastructure networks to MANETs mostly do not have great success [10]. Several reservation-based QoS routing protocols have been proposed for MANETs [11], [12], [13], [14] which creates routes formed by nodes and links that reserve their resources to satisfy QoS requirements. Even though these protocols try to improve the QoS of the MANETs to a certain degree, they suffer from invalid reservation and race condition problems [15]. Invalid reservation problem if the data transmission path between a source and destination nodes breaks the reserved resources becomes useless. Race condition problem refers to a dual allocation of the same resource to two different QoS paths.

V. SCHEME DESCRIPTION

In this paper, we propose a Secure Quality of Service Oriented Distributed routing protocol (SQOD). SQOD contain two contrivances: 1. QoS-Oriented Distributed Routing Protocol (QOD). 2. Enhanced Adaptive ACKnowledgment (EAACK). We use first a QoS-Oriented Distributed routing protocol (QOD)[1]. Usually, a hybrid network has widespread base stations. The data transmission in hybrid networks has two features. 1. An AP can be a source or a destination to any mobile node. Second, the number of transmission hops between a mobile node and an AP is small. The first feature allows a stream to have anycast transmission along multiple transmission paths to its destination through base stations. 2. Enables a source node to connect to an AP through an intermediate node. Taking full advantage of the two features, QOD transforms the packet routing problem into a dynamic resource scheduling problem. QOD is the first work for QoS routing in hybrid networks. This QOD makes five contributions: Earliest Deadline First scheduling algorithm: The algorithm selects qualified neighbors and employs deadline-driven scheduling mechanism to guarantee QoS routing. Distributed packet scheduling algorithm:

After qualified neighbors are identified, this algorithm schedules packet routing. It assigns earlier generated packets to forwarders with higher queuing delays, while assigns more recently generated packets to forwarders with lower queuing delays to reduce total transmission delay. Mobility-based segment resizing algorithm:

The source node adaptively resizes each packet in its packet stream for each neighbor node according to the neighbor's mobility in order to increase the scheduling feasibility of the packets from the source node.

Least Slack First (LSF) scheduling algorithm: In this algorithm, an intermediate node first forwards the packet with the least time allowed to wait before being forwarded out to achieve fairness in packet forwarding. Data redundancy elimination based transmission: Due to the broadcasting feature of the wireless networks, the APs and mobile nodes can overhear and cache packets. This algorithm eliminates the redundant data to improve the QoS of the packet transmission. Specifically, above the algorithms used in QOD, if a source node is not within the transmission range of the AP, a source node selects nearby neighbors that can provide QoS services to forward its packets to base stations in a distributed manner. The source node schedules the packet streams to neighbors based on their queuing condition, channel condition, and mobility, aiming to reduce transmission time and increase network capacity. The neighbors then forward packets to base stations, which further forward packets to the destination. If any intermediate node cannot send the packets to destination. Check the node if it is affected from any attacker or malicious used Enhanced Adaptive ACKnowledgment (EAACK) scheme. EAACK is consisted of three major parts, namely, ACK, secure ACK (S-ACK), and misbehavior report authentication (MRA). In order to distinguish different packet types in different schemes, we included a 2-b packet header in

IPHV8I1022X
International Journal Of Advanced Research and Innovation -Vol.8, Issue .I
ISSN Online: 2319 – 9253
Print: 2319 – 9245

EAACK. According to the Internet draft of DSR [42], there is 6 b reserved in the DSR header. In EAACK, we use 2 b of the 6 b to flag different types of packets.

Packet delivery ratio with Different Mobility Speeds In this experiment, a node's mobility speed was randomly selected from (1; 10; 20; 30; 40). Fig. 8 plots the QoS packet delivery ratio of all systems versus the node mobility speed. It shows that the QoS packet delivery ratio of all systems decrease as node mobility increases. This is because higher mobility causes higher frequent link breakages, which leads to more packet drops. Reestablishing the broken links results in a long transmission delay for subsequent packets. In each experiment, during 50 s, we continually selected a certain number of random nodes to transmit packets to their randomly selected destinations for a time period randomly chosen from [1 to 5]s. As the number of source nodes in the system increases, the percentage of the packet delivery ratio increases. This is because as more packets are generated, every packet in the scheduling queue needs to wait for more time to be forwarded out, which leads to higher packet delivery ratio and hence more delivery packets. We also see that the percentage of the packet delivery ration in SQOD is higher than that of QOD.

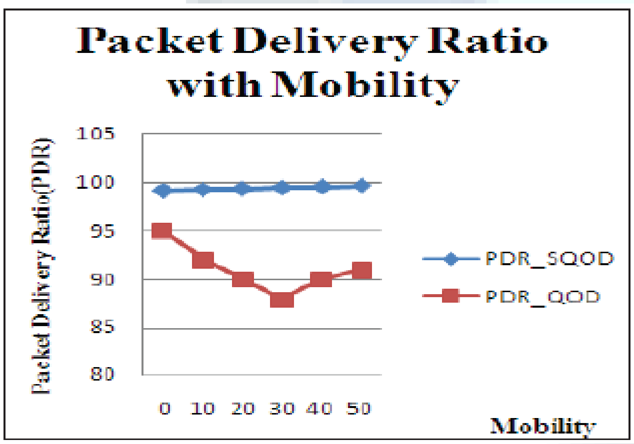

Fig. 2: Packet Delivery Ratio With Different Mobility Speeds

Delay with Different Mobility Speeds In this section, we compare SQOD with QOD for delay. This experiment, a node's mobility speed was randomly selected from (1; 10; 20; 30; 40). Fig. 9 plots the QoS delay of all systems versus the node mobility speed. We let the forwarding nodes receive as many packets from neighbor nodes as possible without admission control to show the performance of SQOD and QOD when the packets are scheduling infeasible. In each experiment, during 50 s, we continually selected a certain number of random nodes to transmit packets to their randomly selected destinations for a time period randomly chosen from [1to 5]s. As the number of source nodes in the system increases, the percentage of the delayed packets increases. This is because as more packets are generated, every packet in the scheduling queue needs to wait for more time to be forwarded out, which leads to higher delay and hence more delayed packets. We also see that the percentage of the delayed packets in QOD is higher than that of SQOD. This is because SQOD always tries to meet the deadlines of packets with the earliest deadlines, while SQOD tries to balance the delay among the packets. Therefore, QOD is able to meet more deadlines than SQOD support the QoS routing due to lower queue delay, while QoD makes full use of the resources of the nodes around a source node, and distributive forwards the packets to the APs, improving the QoS throughput of the system.

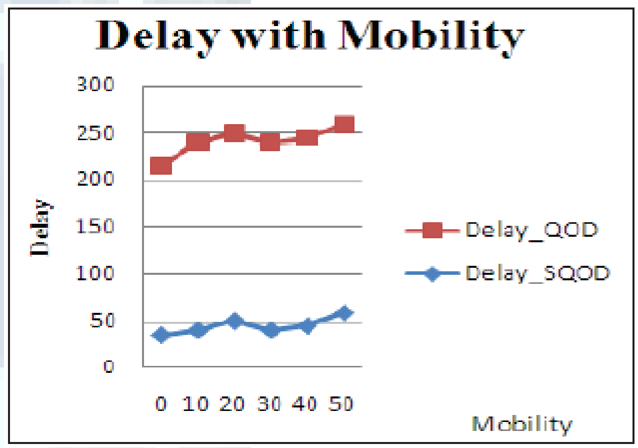

Fig. 3: Delay with Different Mobility Speeds

VI.CONCLUSION

To use Quos algorithm to transforming the data between the nodes. A selfish node isolation method for solving Energy degradation problem .Selfish node isolation method is the method in which the energy less nodes are isolated from the network and find an alternate route for packet transmission. In an ad hoc network, the transmission range of nodes is limited; hence nodes mutually cooperate with its neighbouring nodes in order to extend the overall communication. However, along with the cooperative nodes, there may be some reluctant nodes like selfish nodes and malicious nodes present in the network. Hence it could improve the quality of service of hybrid network in terms of Packet delivery ratio and Delay. These types of transmission accurately deliver the packet to the destination. On such a network, traditional routing mechanisms usually minimize the number of hops, resulting on routes composed by long range, and consequently low throughput, links. Our reservation based mechanism provides a simple and very effective way of using the transmission rate as a routing metric without a significant increase of the signaling message overhead. Previous proposals were very inefficient, hugely increasing the number of signaling messages, what sometimes could even lead to a performance decrease when compared to traditional routing protocols. Although we used transmission rates as the routing metric, our mechanism could also work with many other metrics, such as mean delay, link stability, mobility or available bandwidth.

REFERNCES

[1] Shah R, Rabaey J.,"Energy aware routing for low energy Ad-hoc sensor networks", Proceedings of IEEE WCNC’02, Orlando, FL, March, 2002; pp. 350-355.

[2] Ye Ming Lu, Vincent W.S. Wong,"An energy efficient multipath routing protocol for wireless sensor networks", International Journal of Communication System 20 (7) (2007), pp. 747-766.

[3] T. Reddy, I. Karthigeyan, B. Manoj, C. Murthy, “Quality of Service Provisioning in Ad Hoc Wireless Networks: A Survey of Issues and Solutions,” Ad Hoc Networks, vol. 4, no. 1, pp. 83-124, 2006.

[4] I. Jawhar, J. Wu,“Quality of Service Routing in Mobile Ad- Hoc Networks”, Network Theory and Applications, Springer,2004.

[5] X. Du,“QoS Routing Based on Multi-Class Nodes for Mobile Ad Hoc Networks”, Ad-Hoc Networks, Vol. 2, pp. 241-254, 2004.

[6] M. Conti, E. Gregori, G. Maselli,“Reliable and Efficient Forwarding in Ad Hoc Networks”, Vol. 4, pp. 398-415, 2006.

[7] H. Wu, X. Jia,“QoS Multicast Routing by Using Multiple Paths/Trees in Wireless Ad-Hoc Networks”, Ad-Hoc Networks, Vol. 5, pp. 600-612, 2009.

[8] R. Braden, D. Clark, S. Shenker,"Integrated Services in the Internet Architecture: An Overview, IETF RFC 1633, 1994.

[9] K. Akkaya, M. Younis, An energy aware QoS routing protocol for wireless sensor networks", In: The Proceedings of the 23rd International Conference on Distributed Computing Systems Workshops, Providence, RI, USA, May, 19-22, 2003, pp.710-715.

[10] I. Stoica, H. Zhang,“Providing Guaranteed Services without Per Flow Management”, Proc. ACM Special Interest Group Data Comm. (SIGCOMM), 1999.

[11] P. Jiang, J. Bigham, J. Wu,“Scalable QoS Provisioning and Service Node Selection in Relay Based Cellular Networks”, Proc. Fourth Int’l Conf. Wireless Comm. Networking and Mobile Computing (WiCOM), 2008.

[12] M. Conti, E. Gregori, G. Maselli,"Reliable and Efficient Forwarding in Ad-Hoc Networks", Ad-Hoc Networks, Vol. 4, pp. 398-415, 2006.

[13] G. Chakrabarti, S. Kulkarni,"Load Balancing and Resource Reservation in Mobile Ad Hoc Networks", Ad-Hoc Networks, Vol. 4, pp. 186-203, 2006.

[14] A. Argyriou, V. Madisetti,"Using a New Protocol to Enhance Path Reliability and Realize Load Balancing in Mobile Ad Hoc Networks", Ad-Hoc Networks, Vol. 4, pp. 60-74,2006.

[15] C. Shen, S. Rajagopalan,"Protocol-Independent Multicast Packet Delivery Improvement Service for Mobile Ad –Hoc Networks", Ad-Hoc Networks, Vol. 5, pp. 210-227, 2007.

[16] C.E. Perkins, E.M. Royer, S.R. Das,"Quality of Service in Ad-Hoc On-Demand Distance Vector Routing", IETF Internet draft, 2001.

[17] Z. Shen, J.P. Thomas,"Security and QoS Self-Optimization in Mobile Ad Hoc Networks", IEEE Trans. Mobile Computing,Vol. 7, pp. 1138-1151, Sept. 2008.

[18] Y. Li, A. Ephremides,"A Joint Scheduling Power Control and Routing Algorithm for Ad Hoc Networks", Ad-Hoc Networks, 2008.

[19] T. He, J. Stankovic, C. Lu, T. Abdelzaher,“SPEED: A Stateless Protocol for Real-Time Communication in Sensor Networks”, Proc. 23rd Int’l Conf. Distributed Computing Systems, 2003.

[20] Li, Ze, Haiying Shen,“QoS-Oriented Distributed Routing Protocol for Hybrid Wireless Networks”, 2012, 1-1.

[21] E. Felemban, C. Lee, E. Ekici,“MMSPEED: Multipath Multi-Speed Protocol for QoS Guarantee of Reliability and Timeliness in Wireless Sensor Networks”, IEEE Trans. Mobile Computing, Vol. 5, No. 6, pp. 738-754, June 2006.