Secure Position Based Opportunistic Routing For Efficient Packet Delivery In Manet

SATHYA.S[#1]
Assistant Professor / Department Of CSE,
Tejaa Shakthi Institute Of Technology For Women,
Coimbatore – India
sathyasuriyanme@gmail.com.

ABSTRACT - There is a big challenge and an increasing demand to design more reliable protocol under unreliable condition. In this paper, we proposed a reliable packet forwarding method to addresses the problem of delivering data packets in a reliable and timely manner. POR and VDVH protocols are designed to provide reliable and energy efficient packet delivery in MANET. The reliability is achieved through these protocols, which takes advantage of void handling mechanism that rechoose better next hops to forward the packet without packet loss. In this approach the nodes in the forwarding group should also have the possibility to act as a compromised node which will also affect data delivery, for this SPOR protocol was proposed, that guarantees the discovery of correct connectivity information over an unknown network, in the presence of malicious nodes. In this paper POR ,VDVH is compared with DSR and AODV. Our results indicate that POR, SPOR and VDVH protocol are used to achieve more scalable and reliable multicast transmissions in the presence of constant topology change of MANET and has achieve high reliability and throughput with less delay.

Keywords – Reliable data delivery, Position-based opportunistic Routing, Virtual destination–based void handling, Mobile Adhoc Networks.

I. INTRODUCTION

Mobile Ad-hoc Networks (MANETs) are future wireless networks consisting entirely of mobile nodes that communicate on-the-move without base stations. Nodes in these networks will both generate user and application traffic and carry out network control and routing protocols. Rapidly changing connectivity, network partitions, higher error rates, collision interference, and bandwidth and power constraints together pose new problems in network control particularly in the design of higher level protocols such as routing and in implementing applications with Quality of Service requirements. A MANET system is a group of mobile devices which need to provide the ability to stream voice, data and video between arbitrary pairs of devices utilizing the others as relays to avoid the need for infrastructure. Multicast is a fundamental service for supporting information exchanges and collaborative task execution among a group of users and enabling cluster-based computer system design in a distributed environment. Commercial and military applications have motivated the expeditious development of MANET environments since the mobile nodes can move freely. Typical examples of applications, as shown in, include military battlefield communications, disaster rescue scenarios, ad hoc meetings, remote medical therapy, and wireless personnel home networks, etc. In wireless environments, since the mobile nodes within wireless environments usually have low processing capabilities. In addition, a mobile ad hoc network (MANET) allows arbitrary nodes to move in or out freely and thus the topology of the network changes quickly and makes it difficult to guarantee the packet transmission of the wireless network. But sometimes the delivering of data packets for highly dynamic mobile ad hoc networks in a reliable and timely manner finds an issue.

Once the path breaks, data packets will get lost or be delayed for a long time until the reconstruction of the route, causing transmission interruption. For secure and reliable data delivery, A Position-based Opportunistic Routing protocol is proposed. If the best forwarder does not forward the packet in certain time slots, suboptimal candidates will take turn to forward the packet according to a locally formed order. In the case of communication hole, propose a Virtual Destination-based Void Handling protocol in which the advantages of greedy forwarding and opportunistic routing can still be achieved while handling communication voids. The nodes in the forwarding group should also have the possiblity to act as a compromised node which will also affect data delivery. To alleviate this problem, secure position based opportunistic routing protocol was proposed in manet.

II. RELATED WORK

A position-based opportunistic routing protocol which can be deployed without complex modification to MAC protocol and achieve multiple reception without losing the benefit of collision avoidance provided by 802.11. The concept of in-the-air backup significantly enhances the robustness of the routing protocol and reduces the latency and duplicate forwarding caused by local route repair. In order to enable opportunistic forwarding in void handling, which means even in dealing with voids, we can still transmit the packet in an opportunistic routing like fashion, virtual destination is used, as the temporary target that the packets are forwarded to. In this, analyze the effect of node mobility on packet delivery and explain the improvement brought about by the participation of forwarding candidates. In order to enhance the robustness of POR in the network where

© 2013 IJAIR. ALL RIGHTS RESERVED

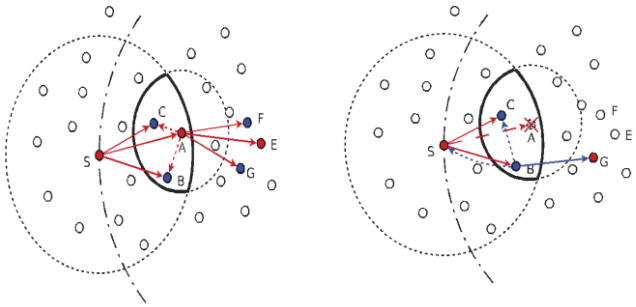
nodes are not uniformly distributed and large holes may exist, a complementary void handling mechanism based on virtual destination is proposed. To improve security of data, A trust estimator is used in each node to evaluate the trust level of its neighboring nodes. Evaluating the performance of proposed schemes by simulation and compare them with other routing protocols.

III. METHODOLOGY

A. Position Based Opportunistic Routing

Position-based Opportunistic Routing (POR) protocol, in which several forwarding candidates cache the packet that has been received using MAC interception. If the best forwarder does not forward the packet in certain time slots, suboptimal candidates will take turn to forward the packet according to a locally formed order. In this way,as one of the candidates succeeds in receiving and forwarding the packet, the data transmission will not be interrupted.

In Fig. 1, the area enclosed by the bold curve is defined as the forwarding area. The nodes in this area, besides node A (nodes B, C), are potential candidates. According to the required number of backup nodes, some of them will be selected as forwarding candidates. The priority of a forwarding candidate is decided by its distance to the destination. The nearer it is to the destination, the higher priority it will get.



(a) (b)

Fig. 1 (a) The operation of POR in normal situation.

(b) The operation of POR when the next hop fails to receive the packet.

When a node sends or forwards a packet, it selects the next hop forwarder as well as the forwarding candidates among its neighbors. The next hop and the candidate list comprise the forwarder list. The candidate list will be attached to the packet header and updated hop by hop. Only the nodes specified in the candidate list will act as forwarding candidates. The lower the index of the node in the candidate list, the higher priority it has.

B. Virtual Destination Based Void Handling

In order to enhance the robustness of POR in the network where nodes are not uniformly distributed and large holes may exist, a complementary void handling mechanism based on virtual destination is proposed. In many existing geographic routing protocols, the mode change happens at the void node, e.g., Node B in Fig. 2. Then, Path 1 (A-B-E) and/or Path 2 (A-B-C-F-) can be used to route around the communication hole.

From Fig. 2, it is obvious that Path 3 (A-C-F) is better than Path 2. If the mode switch is done at Node A, Path 3 will be tried instead of Path 2 while Path 1 still gets the chance to be used. A message called void warning, which is actually the data packet returned from Node B to Node A with some flag set in the packet header, is introduced to trigger the void handling mode.

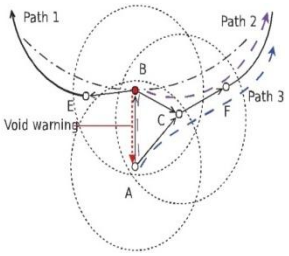


Fig. 2 Potential paths around the void.

As soon as the void warning is received, Node A referred to as trigger node will switch the packet delivery from greedy mode to void handling mode and rechoose better next hops to forward the packet. Of course, if the void node happens to be the source node, packet forwarding mode will be set as void handling at that node without other choice.

1) Virtual Destination

In order to enable opportunistic forwarding in void handling, which means even in dealing with voids, it can still transmit the packet in an opportunistic routing like fashion, virtual destination is introduced, as the temporary target that the packets are forwarded to.

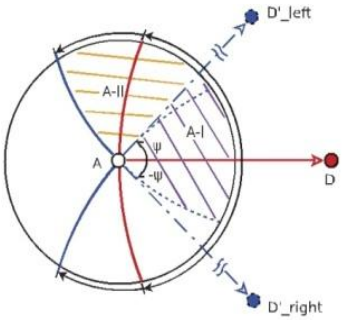


Fig. 3. Potential forwarding area is extended with virtual destination.

© 2013 IJAIR. ALL RIGHTS RESERVED

Virtual destinations are located at the circumference with the trigger node as center (Fig. 3), but the radius of the circle is set as a value that is large enough They are used to guide the direction of packet delivery during void handling. VDVH has the potential to deal with all kinds of communication voids.

C. Secure position-based opportunistic routing

The nodes in the forwarding group should also have the possiblity to act as a compromised node which will also affect data delivery. To alleviate this problem secure position based opportunistic routing was proposed in manet. All the nodes in an ad hoc network are categorized as friends, acquaintances or strangers based on their relationships with their neighboring nodes. During network initiation all nodes will be strangers to each other. A trust estimator is used in each node to evaluate the trust level of its neighboring nodes. The trust level is a function of various parameters like length of the association, ratio of the number of packets forwarded successfully by the neighbor to the total number of packets sent to that neighbor, ratio of number of packets received intact from the neighbor to the total number of received packets from that node, average time taken to respond to a route request etc. Accordingly, the neighbors are categorized into friends (most trusted), acquaintances (trusted) and strangers (not trusted).

- Node i is a stranger (S) to neighbor node j
- Node i is an acquaintance (A) to neighbor node j.
- Node i is a friend (F) to neighbor node j.

1. IV. IMPLEMENTATION

The above mechanism is proposed to be implemented using NS2 (network simulator2) and results obtained shall be tabulated and analyzed for further enhancement.

2. V. SIMULATION RESULTS

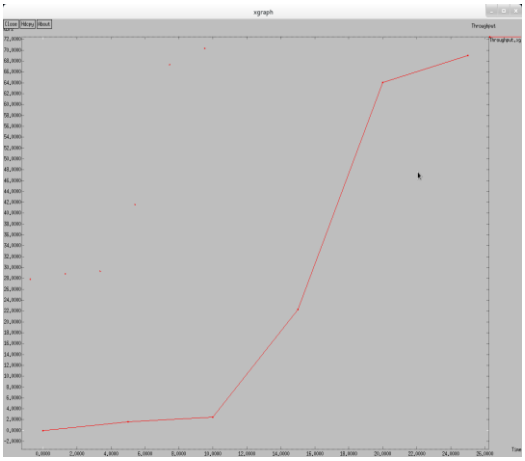


Fig. 4 Average Delay

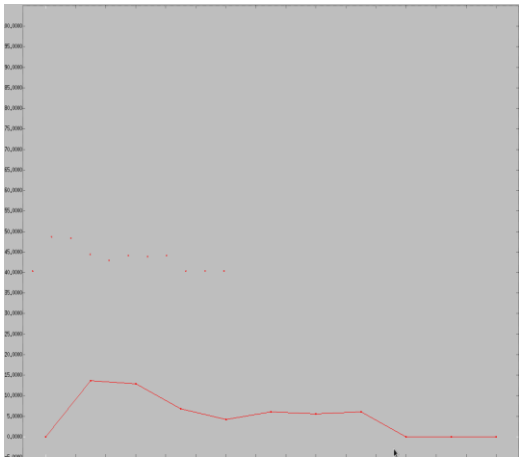


Fig. 5 Throughput

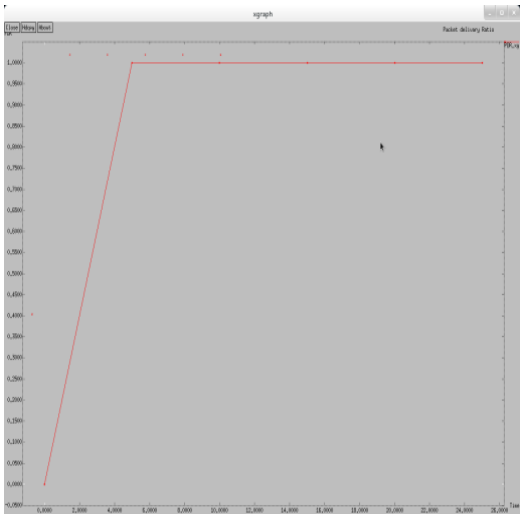


Fig. 6 Packet Delivery Ratio

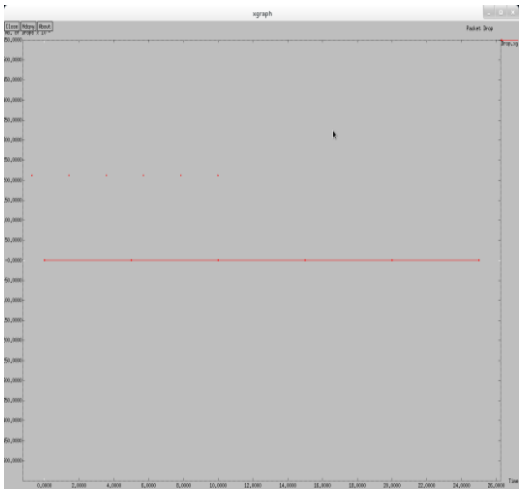


Fig. 7 Packet Drop

© 2013 IJAIR. ALL RIGHTS RESERVED

3. VI. CONCLUSION

The reliable data delivery in highly dynamic mobile ad hoc networks was addressed. Constantly changing network topology makes conventional ad hoc routing protocols incapable of providing satisfactory performance. In the face of frequent link break due to node mobility, substantial data packets would either get lost, or experience long latency before restoration of connectivity. Inspired by opportunistic routing, a novel MANET routing protocol POR was proposed which takes advantage of the stateless property of geographic routing and broadcast nature of wireless medium. Besides selecting the next hop, several forwarding candidates are also explicitly specified in case of link break. Leveraging on such natural backup in the air, broken route can be recovered in a timely manner. The efficacy of the involvement of forwarding candidates against node mobility, as well as the overhead due to opportunistic forwarding is analyzed. The nodes in the forwarding group should also have the possibility to act as a compromised node which will also affect data delivery. To alleviate this problem secure position based opportunistic routing was proposed in manet. The simulation results confirm the effectiveness and efficiency of POR high packet delivery ratio is achieved while the delay and duplication are the lowest. On the other hand, inherited from geographic routing, the problem of communication void is also investigated. SPOR overcomes the problem of malicious nodes in the network topology. Thus following these methodologies an efficient packet delivery is achieved.

4. VII. REFERENCES

[1] Biswas.S and Morris.R, "EXOR: Opportunistic Multi-Hop Routing for Wireless Networks,"(2005), Proc. ACM SIGCOMM, pp. 133-144.

[2] Broch.J, Maltz.D.A, D.B. Johnson, &J.Jetcheva, "A Performance Comparison of Multi-Hop Wireless Ad Hoc Network Routing Protocols," (1998) Proc. ACM MobiCom, pp. 85-97

[3] Chen.D and Varshney.P, "A Survey of Void Handling Techniques for Geographic Routing in Wireless Networks," (Jan.-Mar. 2007), IEEE Comm. Surveys and Tutorials, vol. 9 no. 1, pp. 50-67

[4] Das.S, Pucha.H, and Hu.Y,"Performance Comparison of Scalable Location Services for Geographic AdHocRouting,"(Mar.2005),Proc.IEEE INFOCOM, vol. 2, pp. 1228-1239.

[5]Flury.R and Wattenhofer.R, "MLS: An Efficient Location Service for Mobile Ad Hoc Networks,"(2006) Proc. ACM Int'l Symp. Mobile Ad Hoc Networking and Computing (MobiHoc), pp. 226-237.

[6] Karp.B and Kung H.T., "GPSR: Greedy Perimeter Stateless Routing for Wireless Networks,"(2000), Proc. ACM MobiCom, pp. 243- 254.

[7]Rozner.E, Seshadri.J, Mehta,Y,"SOAR: Simple Opportunistic Adaptive Routing Protocol for Wireless Mesh Networks,"(Dec.2009), IEEETrans.Mobile Computing, vol. 8, no. 12, pp.1622-1635

[8] Mauve.M, Widmer .A, and Hartenstein.H,"A Survey on Position-Based Routing inMobile Ad Hoc Networks," (Nov./Dec. 2001) IEEE Network, vol. 15, no. 6, pp.30-39.

[9] Son.D,Helmy.A,and Krishnamachari.B, "The Effect of Mobility Induced Location Errors on Geographic Routing in Mobile Ad Hoc Sensor Networks: Analysis and Improvement Using Mobility Prediction," (July/Aug. 2004) , IEEE Trans. Mobile Computing, vol. 3, no. 3, pp. 233-245.

[10] Shengbo Yang, Chai Kiat Yeo, and Bu Sung Lee,"Toward Reliable Data Delivery for Highly Dynamic Mobile Ad Hoc Networks", (JAN 2012),IEEE Transactions On Mobile Computing, Vol. 11, No. 1.

5. ACKNOWLEDGMENT

Ms. Sathya Sivasuriyan received M.E degree in Computer Science and Engineering from Anna University, Chennai. She is currently working as an Assistant Professor in the Department of Computer Science and Engineering in Tejaa Shakthi Institute of Technology, Coimbatore. She has published more than 10 papers in both International conferences and National conferences and published a Paper in Journals. She has attended various Seminars, Workshops and Faculty Development Programmes to enhance the knowledge of student's community. Her research interest includes Artificial Intelligence, Networking, Data structures, Cloud Computing

© 2013 IJAIR. ALL RIGHTS RESERVED