Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320–088X

IJCSMC, Vol. 2, Issue. 7, July 2013, pg.214 – 218

RESEARCH ARTICLE

Efficient Routing Protocol for Highly Dynamic Mobile Ad Hoc Networks

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Abstract— Data delivery of packets in broad cast using wireless medium is the main intention of this paper, this will be done through a MANETS and should achieve reliable delivery. To do this various protocols are available in the networks world with in that efficient protocol called Position based opportunistic routing protocol which holds stateless property of geographic routing. When a data packet is sent out, some of the neighbour nodes that have overheard the transmission will serve as forwarding candidates, and take turn to forward the packet if it is not relayed by the specific best forwarder within a certain period of time. The existing routing protocols like DSR, DSDV are susceptible to node mobility. The design of POR is based on Geographic Routing and Opportunistic Forwarding, which transfers the data packet based on the location of the destination.

Key Terms: - Reliable data delivery; Opportunistic forwarding; wireless networks; data pockets delivery; Void handling

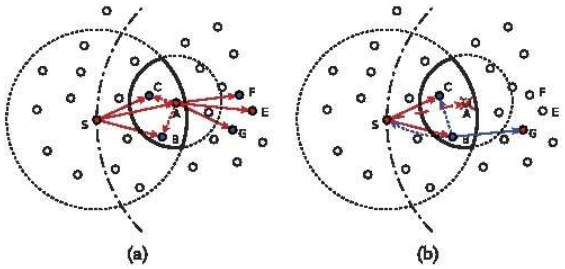
I. INTRODUCTION

To enhance a system's robustness, the most straightforward method is to provide some degree of redundancy. According to the degree of redundancy, existing robust routing protocols for MANETs can be classified into two categories. One uses the end-to-end redundancy, e.g., multipath routing, while the other leverages on the hop-by-hop redundancy which takes advantage of the broadcast nature of wireless medium and transmits the packets in an opportunistic or cooperative way. Our scheme falls into the second category. Brad Karp, H. T. Kung [2] discussed the two dominant factors in the scaling of a routing algorithm, the rate of change of the topology and the number of routers in the routing domain. Under GPSR, packets are marked by their originator with their destinations' locations. As a result, a forwarding node can make a locally optimal, greedy choice in choosing a packet's next hop.

Eric Rozner Jayesh Seshadri Yogita Ashok Mehta Lili Qiu [3] proposed a Simple Opportunistic Adaptive Routing protocol (SOAR) to explicitly support multiple simultaneous flows in wireless mesh networks. Dazhi Chen, Jing Deng, Pramod K. Varshney [4] proposed a Contention-based Geographic Forwarding (CGF) technique. Accordingly, CGF mainly consists of the following components:

1) A predefined forwarding area and nodes that reside in the area become next-hop candidate nodes;
2) A distributed contention arbitration and resolution scheme to effectively establish a single next-hop node in the forwarding area;
3) A next-hop node selection criterion so as to attain the desired network performance efficiently;
4) An effective mechanism to handle voids.

Table 1 Forwarding table in POR



(src_ip, dst_ip)	next_hop	candidate_list
(N1, N11)	N4	N5, N6
(N2, N12)	N7	N8, N5
...	...	...

Fig. 1. (a) The operation of POR in normal situation.
(b) The operation of POR when the next hop fails to receive the packet

A. Existing System

Geographic routing (GR) uses location information to forward data packets, in a hop-by-hop routing fashion. Greedy forwarding is used to select next hop forwarder with the largest positive progress toward the destination while void handling mechanism is triggered to route around communication voids . No end-to-end routes need to be maintained, leading to GR's high efficiency and scalability. However, GR is very sensitive to the inaccuracy of location information . In the operation of greedy forwarding, the neighbour which is relatively far away from the sender is chosen as the next hop. If the node moves out of the sender's coverage area, the transmission will fail. In GPSR (a very famous geographic routing protocol), the MAC-layer failure feedback is used to offer the packet another chance to reroute. However, our simulation reveals that it is still incapable of keeping up with the performance when node mobility increases.

1) Problems with Existing System

1. Getting delay in packet delivery.
2. Packet Losses occurred while intermediate node got failure.
3. By using GR protocol and Greedy forwarding scheme we cannot achieve the 100 % efficiency.
4. GR is very sensitive to the inaccuracy of location information.
5. If the node moves out of the sender's coverage area, the transmission will fail.

B. Proposed System

In this paper, a novel Position-based Opportunistic Routing (POR) protocol[1] is proposed, 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 long as one of the candidates succeeds in receiving and forwarding the packet, the data transmission will not be interrupted. Potential multipaths are exploited on the fly on a per packet basis, leading POR's excellent robustness.

A) Advantages

1. No delay in packet delivery
2. No Packet Losses
3. We can achieve 100 % efficiency.
4. high packet delivery ratio is achieved while the delay and duplication are the lowest.

The additional latency incurred by local route recovery is greatly reduced and the duplicate relaying caused by packet reroute is also decreased.

II. SELECTION AND PRIORIZATION OF FORWARDING CANDIDATES

Only the nodes which are located in the forwarding area can get the chance to be storage nodes.

The following two conditions are should be satisfy for a node which are in the forwarding area.

1. A node makes positive progress towards the destination.

2. Node's distance to the next hop node should not exceed half of the transmission range of a wireless node (i.e:R/2)

In Fig 1, the area enclosed by the bold curve is defined as forwarding area. Beside the node A, the nodes B & c are the potential candidates. The priority of the forwarding candidate is decided by its distance to the destination. 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. If the index of the node is lower then the candidate list the candidate list has the higher priority.

Algorithm 1. Candidate Selection
ListN : Neighbor List
ListC : Candidate List, initialized as an empty list
ND : Destination Node
Base : Distance between current node and N_D

```
if find(ListN, N_D) then
   next_hop← N_D
   return
endif
for i← 0 to length (List N) do
     ListN[i].dist← dist(ListN[i], N_D)
end for
ListN.sort()
next_hop← ListN[0]
for i← 1 to length(ListN) do
    If dist(ListN[i],ND)≥base or length(ListC)=N
    then
        break
    else if dist(listN[i],listN[0])<R/2 then
    ListC.add(ListN[i])
    endif
end for
```

Each and every node maintains the forwarding table for the packets to identified the source – destination pair and it has forwarded. Each and every time it check the table that if a valid item for that destination is available or not. The forwarding table is constructed during data packet transmissions because of that its maintenance is very easy comparing with other routing table. The algorithm1 shows the procedure to select and prioritize the forwarder list.

III. THE MAIN CONTRIBUTION OF THIS PAPER CAN BE SUMMARIZED AS FOLLOWS

1) The proposed position-based opportunistic routing mechanism 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.
2) 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.
3) In the case of communication hole, we propose a Virtual Destination-based Void Handling (VDVH) scheme in which the advantages of greedy forwarding (e.g., large progress per hop) and opportunistic routing can still be achieved while handling communication voids.
4) We analyze the effect of node mobility on packet delivery and explain the improvement brought about by the participation of forwarding candidates.
5) The overhead of POR with focus on buffer usage and bandwidth consumption due to forwarding candidates' duplicate relaying is also discussed. Through analysis, we conclude that due to the selection of forwarding area and the properly designed duplication limitation scheme, POR's performance gain can be achieved at little overhead cost.
6) Finally, we evaluate the performance of POR through extensive simulations and verify that POR achieves excellent performance in the face of high node mobility while the overhead is acceptable.

B) ***Limitation***

These are limitations was happened due to collision of node movement and some forwarding candidates may fail to receive the packets forwarded by the next hop node so duplication will occur. If the forwarding candidate adopts the same forwarding scenario as the next hop node, which means it also calculates a candidate list, then in the worst case, the propagation area of a packet will cover the entire circle comprising the destination as the center and the radius can be as large as the distance between the source and the destination. To limit such duplicate relaying, only the packet that has been forwarded by the source and the next hop node is transmitted in an opportunistic fashion and is allowed to be cached by multiple candidates. In other words, only the source and the next hop node need to calculate the candidate list, while for the packet relayed by a forwarding candidate, the candidate list is empty. Actually, such scheme has already been implied in Fig. 1b (e.g., node B only

forwards the packet to node G). In this way, the propagation area of a packet is limited to a certain band between the source and the destination. In the context of infrastructure networks, by using opportunistic overhearing, the connectivity between the mobile node and base station (BS) can be significantly improved in [9], an opportunistic retransmission protocol

C) Receiver signal strength indicator

PRO is proposed to cope with the unreliable wireless channel. Implemented at the link layer, PRO leverages on the path loss information Receiver Signal Strength Indicator (RSSI) to select and prioritize relay nodes. By assigning the higher priority relay a smaller contention window size, the node that has higher packet delivery ratio to the destination will be preferred in relaying. With respect to the impact of mobility, Wu et al. investigate the WiFi connectivity for moving vehicles, with focus on the cooperation among BSs. BSs that overhear a packet but not its acknowledgment probabilistically relay the packet to the intended next hop. With the help of auxiliary BSs, the new protocol performs much better than those schemes with only one BS participating in the communication even if advanced link prediction and handover methods are involved. However, due to the lack of strict coordination between BSs, false positives and false negatives exist.

IV. CONCLUSIONS

This paper shows the problems of reliable data delivery in mobile ad hoc networks and the solutions also. we mainly investigate the mechanism of working methods of POR protocol . It will reduce the rely and most useful in ever changing topology type in MANETS. The efficacy of the involvement of forwarding candidates against node mobility, as well as the overhead due to opportunistic forwarding is analyzed. Through simulation, we further confirm the effectiveness and efficiency of POR: high packet delivery ratio is achieved while the delay and duplication are the lowest. POR mainly uses the geographic routing mechanism in transiting the pockets in network.

On the other hand, inherited from geographic routing, the problem of communication void is also investigated. To work with the multicast forwarding style, a virtual destination-based void handling scheme is proposed. By temporarily adjusting the direction of data flow, the advantage of greedy forwarding as well as the robustness brought about by opportunistic routing can still be achieved when handling communication voids. Traditional void handling method performs poorly in mobile environments while VDVH works quite well.

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