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Research Paper

TOWARDS RELIABLE DATA DELIVERY FOR HIGHLY DYNAMIC MOBILE Ad-hoc NETWORK

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This paper addresses the problem of delivering data packets for highly dynamic mobile ad hoc networks in a reliable and timely manner. Most existing ad hoc routing protocols are susceptible to node mobility, especially for large-scale networks. Driven by this issue, we propose an efficient Position-based Opportunistic (POR) protocol which takes advantage of the stateless property of geographic routing and the broadcast nature of wireless medium. In the case of communication hole, a Virtual Destination-based Void Handling (VDVH) scheme is further proposed to work together with POR. Both theoretical analysis and simulation results show that POR achieves excellent performance even under high node mobility with acceptable overhead and the new void handling scheme also works well.

Keywords: Introduction, Existing system, Proposed system, Modules

INTRODUCTION

MANET is a wireless network of mobile nodes, it's a self-organized network. Every device can communicate with every other device, i.e., it is also multi hop network. As it is a wireless network it inherits the traditional problem of wireless networking the channel is unprotected from outside signal. The wireless media is unreliable as compared to the wired media. Hidden terminal and expose terminal phenomenon may occur. The channel has time varying and asymmetric propagation properties with these problems there are some other challenges and complexities.

- The scalability is required in MANET as it is used in military communications, because the network grows according to the need, so each mobile device must be capable to handle the intensification of network and to accomplish the task.
- MANET is a infrastructure less network, there is no central administration. Each device can communicate with every other device, hence it becomes difficult to detect and manage the faults. In MANET, the mobile devices can move randomly. The use of this dynamic topology results in route changes, frequent network partitions and possibly packet losses.
- In network every node acts as a router and can forward packets of data to other nodes to provide information partaking among the

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difficult chore to implement ad hoc addressing scheme, the MAC address of the device is used in the stand alone ad hoc network. However every application is based on TCP/IP and UDP/IP.

EXISTING SYSTEM

Multipath Routing, which is typically proposed to increase the reliability of data transmission in wireless ad hoc networks, allows the establishment of multiple paths between the sources and the destination. Existing routing protocols are broadly classified into the following three types

1. Using alternate paths as backup
2. Packet replication along multiple paths
3. Split, multipath delivery, reconstruction using some coding techniques,

Drawback of Multipath Routing Protocol

It may be difficult to find suitable number of independent paths. More importantly, in the face of high node mobility, all paths may be broken with considerably high probability due to constantly changing topology, especially when the end-to-end path length is long, making multipath routing still incapable of providing satisfactory performance.

Geographic Routing

Geographic routing 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 towards 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.

Drawback

- GR is very sensitive to the inaccuracy of location information.
- In operation of greedy forwarding, the neighbor 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 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.
- Due to error prone nature of wireless channel and dynamic network topology, reliable data delivery in MANET, especially in challenged environment with high node mobility remains an issue.
- Owing to the constantly and even fast changing network topology, it is very difficult to maintain a deterministic route, the discovery and recovery procedures are also time and energy consuming. 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.

PROPOSED SYSTEM

In this paper, a novel Position-based Opportunistic Routing (POR) protocol 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 to POR's excellent robustness.

Advantages

- Positioned–based opportunistic routing mechanism which can be deployed without complex modification to MAC protocol and achieve multiple receptions without losing the benefit of collision avoidance.
- In the case of communication hole, a Virtual Destination based Void Handling mechanism (VDVH) scheme in which the advantages of greedy forwarding and opportunistic routing can still be achieved while handling communication voids.
- We analyze the effect of node mobility on packet delivery and explain the improvement brought about by the participation of forwarding candidates.

MODULES

- Positioned-based opportunistic routing protocol
- Selection and prioritization of forwarding candidates
- Trigger node
- Virtual destination-based void handling
- Memory consumption and duplicate relaying

Positioned-Based Opportunistic Routing Protocol

POR design is based on geographic routing and opportunistic forwarding. The nodes are thought to be aware of their location and their direct neighbor's positions. Neighborhood location information is exchanged through a one-hop beacon or piggyback in the data packet header. Then the location registration and lookup service that maps node addresses to the locations is available for the destination position, which can be realized through use of many types of location service.

Routing Mechanism

The source node obtains the address of the destination from a location registration and lookup service. It then attaches destination's address to the packet header. If the destination is within the source's transmission range, then the next hop is the destination. The packets are forwarded directly and the routing process ends

Selection and Prioritization of Forwarding Candidates

One of the key factor in POR is the selection and prioritization of forwarding candidates. Hence neighbors are prioritized based on the node which makes positive progress towards the destination and that node gets the highest priority to become the best forwarder. Selection of Best Forwarder and Candidate Node Forwarding area is selected as the intersection area of the transmission range of the source and half of the transmission range of the best forwarder. Among the nodes within this intersection area, only those nodes which are closer to the destination than the source and which are farther from the destination than the best forwarder, become the candidate nodes. The candidate list is attached to the packet header and the packet is broadcast. The best forwarder and the candidate nodes cache the packets. If the best forwarder fails to transmit the packets, then the candidate node with the next highest priority transmits the packet. All other candidate nodes get suppressed on hearing the transmission and drop the cached packets. Duplicate packets can be identified using a sequence number and are not propagated further.

Trigger Node

Routing Hole Handling Communication holes may exist since nodes are not uniformly distributed. When the best forwarder seeks the next hop node and finds none, a communication void is said to be encountered. The protocol then switches to a routing hole handling mechanism. When the best forwarder encounters a communication hole, it sends a void signal to the previous forwarder. The previous forwarder becomes the trigger node and the best forwarder becomes the void node.

Virtual Destination-Based Void Handling

Virtual Destination Virtual Destination based Void Handling Technique first selects the Trigger node in which it is responsible for transmitting data in Void situations. To handle communication voids, almost all existing Mechanisms try to find a route around. During the void handling process, the advantage of greedy forwarding cannot be achieved as the path that is used to go around the hole is usually not optimal. In order to enable opportunistic forwarding in void handling, which means even in dealing with voids, It may route around the void. If destination is reached, then an acknowledgement is sent to the trigger node, else a disrupt signal is sent.

Virtual Destination

Virtual destination is introduced, as the temporary target that the packets are forwarded to. Virtual destinations are located with the trigger node as center and the radius of the circle is set as a value that is large enough (e.g., the network diameter). a virtual destination has a certain degree of offset, compare to real destination. Compared to the real destination D, a virtual destination (e.g., D_ Left and D_ right) has a certain degree of offset. The potential forwarding area is significantly extended, with the help of virtual destination.

Memory Consumption and Duplicate Relaying

One main concern of POR is its overhead due to opportunistic forwarding, as several copies of a packet need to be cached in the forwarding candidates, leading to more memory consumption, and duplicate relaying would possibly happen if the suppression scheme fails due to node mobility. We first look into the issue of memory consumption. If a packet is received by a forwarding candidate, it will be cached for a period of time T at most according to the forwarding scheme. Therefore, we can get the following upper bound for the length (number of packets cached) of the packet list. Then, we look into the overhead due to duplicate relaying.

CONCLUSION

In this paper, we address the problem of reliable data Delivery in highly dynamic mobile ad hoc networks. 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, we propose a novel MANET routing protocol POR 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. 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.

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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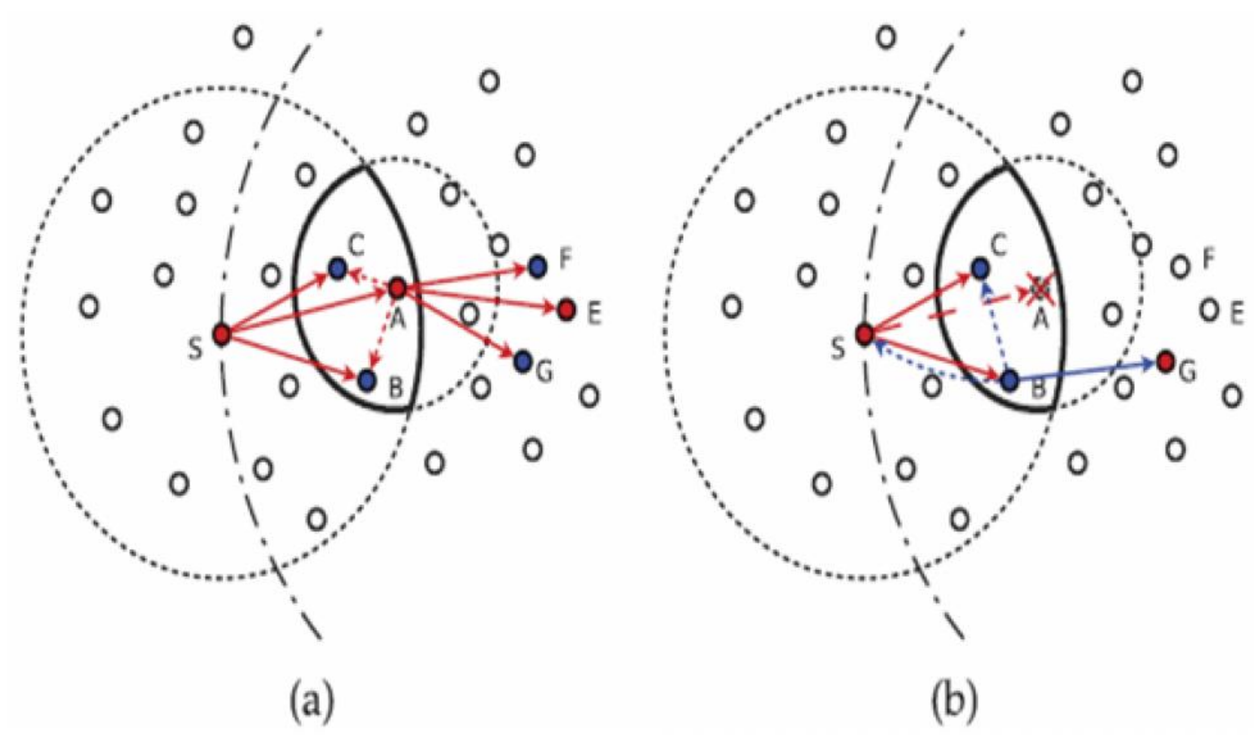
APPENDIX

Figure 1: (a) The Operation of POR in Norma Situation, (b) The Operation of POR When the Next Hop Fails to Receive the Packet



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