Volume 2, No. 12, December 2011
Journal of Global Research in Computer Science
RESEARCH PAPER
Available Online at www.jgrcs.info
ISSN-2229-371X

ROUTING ANALYSIS IN MANET

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Abstract- A greedy anti void routing (GAR) protocol is proposed to solve the void problem with increased routing efficiency by exploiting the boundary finding technique for the unit disk graph (UDG). The proposed rolling-ball UDG boundary traversal (RUT) is employed to completely guarantee the delivery of packets from the source to the destination node under the UDG network. The boundary map (BM) and the indirect map searching (IMS) scheme are proposed as efficient algorithms for the realization of the RUT technique. Moreover, the hop count reduction (HCR) scheme is utilized as a short-cutting technique to reduce the routing hops by listening to the neighbour's traffic, while the intersection navigation (IN) mechanism is proposed to obtain the best rolling direction for boundary traversal with the adoption of shortest path criterion. In order to maintain the network requirement of the proposed RUT scheme under the non-UDG networks, the partial UDG construction (PUC) mechanism is proposed to transform the non-UDG into UDG setting for a portion of nodes that facilitate boundary traversal. These three schemes are incorporated within the GAR protocol to further enhance the routing performance with reduced communication overhead.

Index terms: greedy anti void routing, unit disk graph, rolling-ball unit disk graph boundary traversal, boundary map, indirect map search scheme, hop count reduction.

INTRODUCTION

In networks comprised entirely of wireless stations, communication between source and destination nodes may require traversal of multiple hops, as radio ranges are finite. A community of adhoc network researchers has proposed, implemented, and measured a variety of routing algorithms for such networks. The observation that topology changes more rapidly on a mobile, wireless network than on wired networks.

As mobile computing requires more computation as well as communication activities, energy efficiency becomes the most critical issue for battery-operated mobile devices. Specifically, in ad hoc networks where each node is responsible for forwarding neighbour node's data packets, care has to be taken not only to reduce the overall energy consumption of all relevant nodes but also to balance individual battery levels. Unbalanced energy usage will result in earlier node failure in overloaded nodes, and in turn may lead to network partitioning and reduced network lifetime. Localized routing algorithms which achieves a trade-off between balanced energy consumption and shortest routing delay, and at the same time avoids the blocking and route cache problems.

In this article, we introduce a greedy anti-void routing (GAR) protocol is proposed to solve the void problem with increased routing efficiency by exploiting the boundary finding technique for the unit disk graph (UDG). The proposed rolling-ball UDG boundary traversal (RUT)is employed to completely guarantee the delivery of packets from the source to the destination node under the UDG network. The boundary map (BM) and the indirect map searching (IMS) scheme are proposed as efficient algorithms for the realization of the RUT technique.

Our Contribution:

a. A greedy anti void routing (GAR) protocol is used to solve the void problem with increased routing efficiency by exploiting the boundary finding technique for the unit disk graph (UDG). The proposed rolling-ball UDG boundary traversal (RUT) is employed to completely guarantee the delivery of packets from the source to the destination node under the UDG network.
b. The boundary map (BM) and the indirect map searching (IMS) scheme are proposed as efficient algorithms for the realization of the RUT technique
c. The hop count reduction (HCR) scheme is utilized as a short-cutting technique to reduce the routing hops by listening to the neighbour's traffic, while the intersection navigation (IN) mechanism is proposed to obtain the best rolling direction for boundary traversal with the adoption of shortest path criterion.

NETWORKING MODULE

Client-server computing or networking is a distributed application architecture that partitions tasks or workloads between service providers (servers) and service requesters, called clients. Often clients and servers operate over a computer network on separate hardware. A server machine is a high-performance host that is running one or more server programs which share its resources with clients. A client also shares any of its resources; Clients therefore initiate communication sessions with servers which await (listen to) incoming requests.

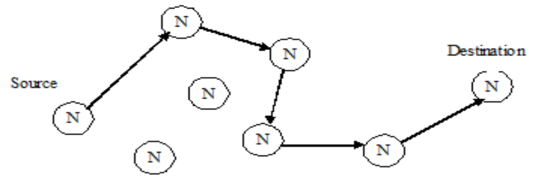

Figure.1 Network Model

BOUNDARY EVALUATION MODULE

The RUT scheme is adopted to solve the boundary finding problem, and the combination of the GF and the RUT scheme (i.e., the GAR protocol) can resolve the void problem, leading to the guaranteed packet delivery.

Greedy Forwarding:

In the first mechanism, all data packets are forwarded to an adjacent neighbour that is geographically positioned closer to the intended destination. This mechanism is known as greedy forwarding. The forwarding is done on a packet to packet basis. Hence, minimal state Information is required to be retained by all nodes. It makes protocol most suitable for resource starved devices. The greedy forwarding mechanism is shown in Figure1. However, this mechanism is susceptible to failure in situations where the distance between forwarding node and final destination is less than the distance between the forwarding node's adjacent neighbours and destination.

Rolling-Ball UDG Boundary Traversal (RUT) Scheme:

The definition of boundary and the problem statement are described as follows:

Boundary finding problem*:* Given a UDG G (P, E) and the one-hop neighbor tables T= {TNi│□ Ni€ N}, how can a boundary be obtained by exploiting the distributed Computing techniques? There are three phases within the RUT scheme, including the initialization, the boundary traversal, and the termination phases.

Initialization Phase:

Rolling Ball: Given Ni€ N, a rolling ball RBNi (si, R,/2) is defined by 1) a rolling circle hinged at PNi with its center point at si€ IR2 and the radius equal to R/2, and 2) There does not exist any Nk€ N located inside the rolling ball as(RB Ni (si,R/2) N} = Ø, where RB Ni si;R=2Þ de- notes the open disk within the rolling ball.

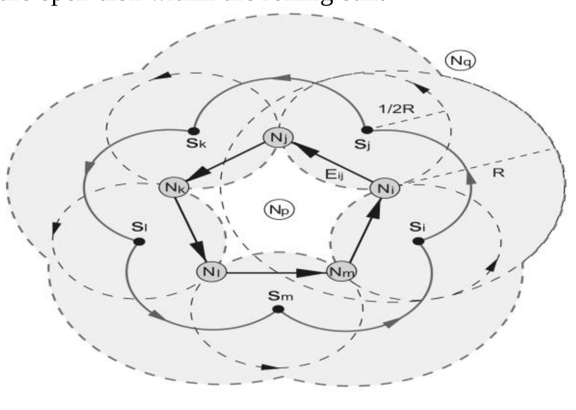

Figure 2.RUT Scheme

Starting point*:* The SP of Ni within the RUT scheme the center point si€ IR2 of R BNi (si, R,/2). In Fig. 2, each node Ni can verify if there exists an SP since the rolling ball RBNi (si, R,/2) is bounded by the transmission range of Ni.According to the SPs should be located on the circle centered at PNi with a radius of R/2. As will be proven in Lemmas 1 and 2, all the SPs will result in the red solid flower-shaped arcs, as in Fig. 2. It is noticed that there should always exist an SP, while the void problem occurs within the network.

Boundary Traversal Phase:

Given si as the SP associated with its RBNi (si,R/2)hinged at Ni, either the counterclockwise or clockwise rolling direction can be utilized. As shown in Fig. 2RBNi (si, R,/2) is rolled counterclockwise until the next SN is reached (i.e., Njin Fig. 2). The unidirectional edge Eij=(PNi,PNj) can therefore be constructed. A new SP and the corresponding rolling ball hinged at Nj(i.e., sj and RBNi (si, R,/2)) will be assigned, and consequently, the same procedure can be conducted continuously.

Termination Phase:

The termination condition for the RUT scheme happens while the first unidirectional edge is revisited. As shown in Fig. 2, the RUT scheme will be terminated if the edge Eij is visited again after the edges Eij, Ejk, Ekl, Elm, and Emi are traversed. The boundary set initiated from Ni can therefore be obtained as B = {Ni, Nj, Nk, Nl, Nm}.

GREEDY ANTI-VOID TRAVERSAL

The objective of the GAR protocol is to resolve the void problem such that the packet delivery from NS to ND can be guaranteed. Before diving into the detail formulation of the proposed GAR algorithm, an introductory example is described in order to facilitate the understanding of the GAR protocol. As shown in Fig.3 the data packets initiated from the source node NS to the destination node ND will arrive in NV based on the GF algorithm. The void problem occurs as NV receives the packets, which leads to the adoption of the RUT scheme as the forwarding strategy of the GAR protocol. A circle is formed by centering at Sv with its radius being equal to half of the transmission range R=2. The circle is hinged at NV and starts to conduct counterclockwise rolling until an SN has been encountered by the boundary of the circle, i.e., NA, as in Fig. 3. Consequently, the data packets in NV will be forwarded to the encountered node NA. Subsequently, a new equal-sized circle will be formed, which is centered at S_A and hinged at node NA. The counterclockwise rolling procedure will be proceeded in order to select the next hop node, i.e., NB in this case. Similarly, same process will be performed by other intermediate nodes (such as NB and NX)Until the node NY is reached, which is considered to have a smaller distance to ND than that of NV to ND? The conventional GF scheme will be resumed at NY for delivering data packets to the destination node ND. As a consequence, the resulting path by adopting the GAR protocol becomes {NS, NV, NA, NB, NX, NY, NZ, ND}.

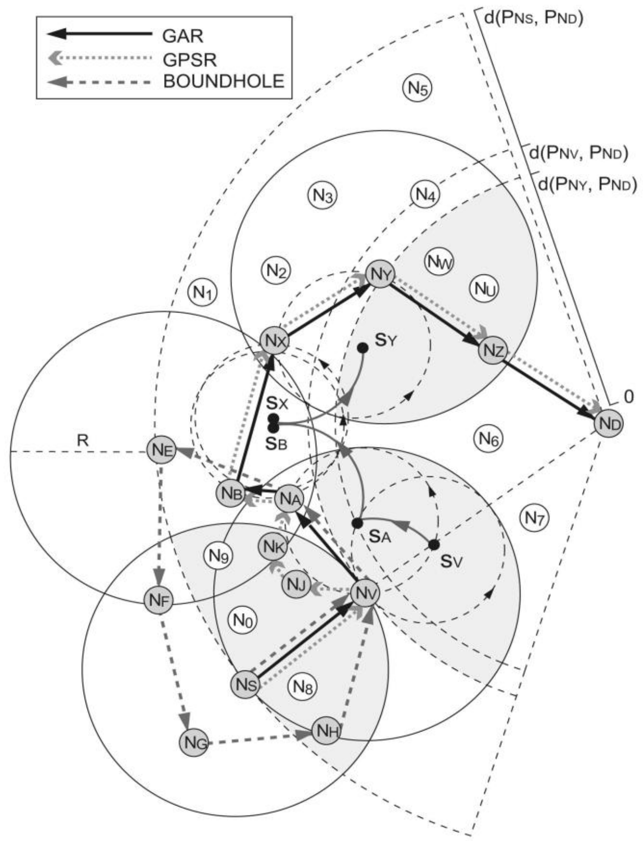

Figure. 3 Routing paths are constructed using the GAR, the GPSRand BOUNDHOLE algorithms for the existence of the void problem.

***Enhanced Mechanisms for Proposed GAR Protocol**:*

Basically there are some mechanisms which can be implemented or incorporated in this GAR protocol to make this GAR work even better in the network. In the Figure2 mechanism is explained. Those 3 mechanisms are

- Hop count Reduction
- Intersection Navigation
- Partial UDG construction.

Mechanism 1 – Hop Count Reduction (HCR):

Based on the rolling-ball traversal within the RUT scheme, the selected next-hop nodes may not be optimal by considering the minimal HC criterion. Excessive routing delay associated with power consumption can occur if additional hop nodes are traversed by adopting the RUT scheme. According to the concept as stated above, the HCR mechanism is to acquire the information of the next few hops of neighbours under the RUT scheme by listening to the same forwarded packet. It is also worthwhile to notice that the listening process does not incur additional transmission of control packets.

Mechanism 2 – Intersection Navigation (IN):

The IN mechanism is utilized to determine the rolling direction in the RUT scheme while the void problem occurs. It is noticed that the selection of rolling direction (i.e., either counter clockwise or clockwise) does not influence the correctness of the proposed RUT scheme to solve Boundary Traversal problem as in **Theorem 1**. However, the routing Efficiency may be severely degraded if a comparably longer routing path is selected at the occurrence of a void node. The primary benefit of the IN scheme is to choose a feasible rolling direction while a void node is encountered. Consequently, smaller rerouting HCs and packet transmission delay can be achieved. Considerable routing efficiency can be preserved as a shorter routing path is selected by adopting the IN mechanism.

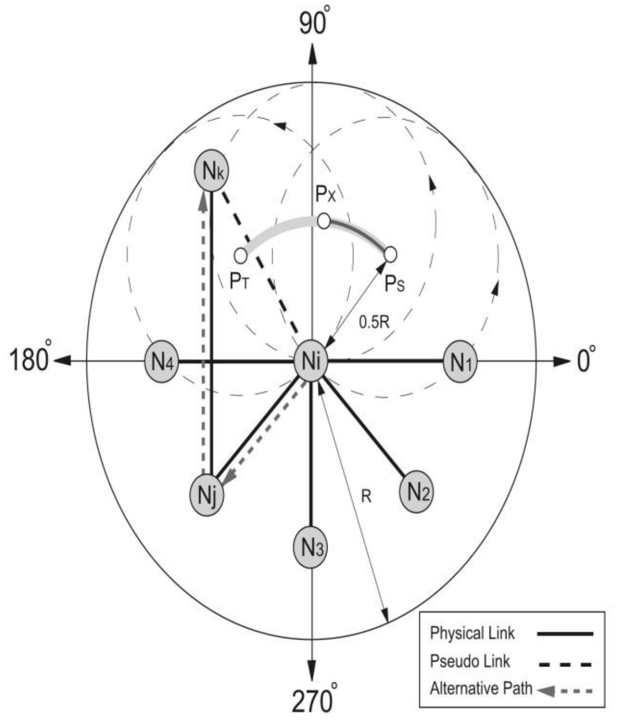

Figure.**4**Shows the SP and non SP arc segments with respect to Ni and the resulting BM.

PARTIAL UDG CONSTRUCTION (PUC) MECHANISM

The PUC mechanism is targeted to recover the UDG linkage of the boundary node Ni within a non-UDG network. The boundary nodes within the proposed GAR protocol are defined as the SNs that are utilized to handle the packet delivery after encountering the void problem. As node Ni is considered a boundary node since the converged SP arc segment *SSPNi (PS, PT)* exists after Ni conducts the proposed IMS algorithm by the input of the current one-hop neighbours *{N1;N2;N3;N4;Nj}*. It is noted that the boundary nodes consist of a portion of the network SNs. Therefore, conducting the PUC mechanism only by the boundary nodes can conserve network resources than most of the existing flooding-based schemes that require information from all the network nodes. The protocol defined with all these enhancements is called as the GAR – E (i.e. The Enhanced GAR) protocol. This protocol thus stated with all these mechanisms works more appropriate and more effectively than the GAR protocol.

PERFORMANCE EVALUATION MODULE

The performance of the proposed GAR algorithm is evaluated and compared with other existing localized schemes via simulations, including the reference GF algorithm, the planar graph-based GPSR and GOAFR++ schemes, and the UDG-based BOUNDHOLE algorithm. It is noted that the GPSR and GOAFR++ schemes that adopt the GG planarization technique to planarize the network graph are represented as the GPSR (GG) and GOAFR++(GG) algorithms, while the variants of these two schemes with the CLDP planarization algorithm are denoted as the GPSR(CLDP) and GOAFR++(CLDP) protocols. The random topology is considered in both two different types of network simulations as follows: 1) the pure UDG network as the ideal case, and 2) the non- UDG network for realistic network environment. Furthermore, the GAR protocol with the enhanced mechanisms (i.e., the HCR, the IN, and the PUC schemes) is also implemented, which is denoted as the GAR-E algorithm. The simulations are conducted in the network simulator (NS-2) with wireless extension, using the IEEE 802.11 DCF as the MAC protocol. The parameters utilized in the simulations are listed, as shown in Table 1, and the following five performance metrics are utilized in the simulations for performance comparison:

Packet arrival rate **-** The ratio of the number of received data packets to the number of total data packets sent by the source.

Average end-to-end delay **-** The average time elapsed for delivering a data packet within a successful transmission.

Path efficiency **-** The ratio of the number of total HCs within the entire routing path over the number of HCs for the shortest path.

Communication overhead **-** The average number of transmitted control bytes per second, including both the data packet header and the control packets.

Energy consumption **-** The energy consumption for the entire network, including transmission energy consumption for both the data and control packets under the bit rate of 11 megabits per second (Mbps) and the transmitting power of 15 dBm for each SN

Table 1simulation Parameters

Parameter Type	Parameter Value
Network Area	1000x800m2
Simulation Time	150 sec
Transmission range	250m
Traffic Type	Constant bit rate(CBR)
Data Rate	12kbps
Size of Data Packets	512 bytes
Node Degree	17.5

The simulations of the performance metrics versus the void height, i.e., the height of each void block, are conducted and compared with other baseline protocols under the UDG and the non-UDG networks. The non- UDG network is obtained by randomly removing some of the communication links within the original UDG network for violating the properties of the UDG setting.

Greedy Other Adaptive Face Routing (GOAFR) algorithm: GOAFR combines the Greedy Routing and OAFR, such that it is both average-case efficient and worst case optimal. In general GOAFR does Greedy routing as long as possible and only uses OAFR to tackle the local minima. The details of GOAFR are as follows. GOAFR also has a bounding ellipse.

Initially, the length of the major axis is $c = 2jstj$.
The algorithm starts by Greedy Routing inside the bounding ellipse. There are two cases to interrupt a Greedy Phase.

a. The bounding ellipse is too small, i.e. the current node does have neighbours closer to *t*, but all such neighbours lie outside the bounding ellipse.
b. The current node is indeed a local minimum, i.e. it has no neighbour closer to *t* in the entire graph.

In the former case, we double the length of *c*, and continue the Greedy Routing inside the larger ellipse. In the latter case, we have to use OAFR. An OAFR Phase of GOAFR only traverses one face boundary to get around the local minimum. After that, GOAFR returns to the Greedy Routing immediately. Here in *fig3* the flow of the IMS is shown.
The details of an OAFR Phase are the same as the original OAFR algorithm. It tries to find the best possible node inside the bounding ellipse and doubles the major axis when necessary. Note that the bounding ellipse never shrinks after GOAFR returns to te Greedy Routing.

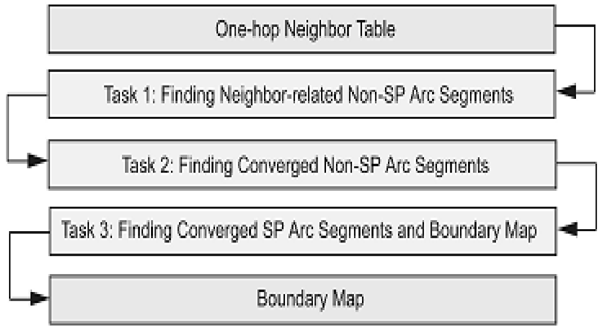

Figure 5: The process flow of the IMS algorithm

CONCLUSION

In this paper, a UDG-based GAR protocol is proposed to resolve the void problem incurred by the conventional GF algorithm. The RUT scheme is adopted within the GAR protocol to solve the boundary finding problem, which results in guaranteed delivery of data packets under the UDG networks. The BM and the IMS are also proposed to conquer the computational problem of the rolling mechanism in the RUT scheme, forming the direct mappings between the input/output nodes. The proposed GAR algorithms can guarantee the delivery of data packets under the UDG network.

REFERENCES

[1]. D. Estrin, R. Govindan, J. Heidemann, and S. Kumar, “Next Century Challenges: Scalable Coordination in Sensor Networks,” Proc. ACM MobiCom, pp. 263-270, Aug. 1999.

[2]. B. Karp and H.T. Kung, “GPSR: Greedy Perimeter Stateless Routing for Wireless Networks,” Proc. ACM MobiCom, pp. 243- 254, Aug. 2000.

[3]. I. Stojmenovi_c and X. Lin, “Loop-Free Hybrid Single-Path Flooding Routing Algorithms with Guaranteed Delivery for Wireless Networks,” IEEE Trans. Parallel and Distributed Systems, vol. 12, no. 10, pp. 1023-1032, Oct. 2001.

[4]. R. Jain, A. Puri, and R. Sengupta, “Geographical Routing Using Partial Information for Wireless Ad Hoc Networks,”

IEEE Personal Comm. Magazine, vol. 8, no. 1, pp. 48-57, Feb. 2001

[5]. BOSE, P., MORIN, P., STOJMENOVI´C, I., AND URRUTIA,J. Routing with guaranteed delivery in ad hoc wireless Networks. Workshop on Discrete Algorithms and Methods for Mobile Computing and Communications (DialM ’99), Aug. 1999.

[6]. D.chen and P.K Varshney,”On-demand Geographic Forwarding for data delivery in wireless sensor networks,” Elsevier computer comm., vol.30, no.14-15, pp.2954-2967, oct.2007.

[7]. I.stojmenovi’c, M. Russell, and B. ukojevic,”Depth first search and location based localized routing and Qos routing in wireless networks”, proc IEEE Int’l Conf.parallel processing (ICPP ’00), PP.173-180, Aug. 2000.

[8]. H. Frey and I. Stojmenovi’c, “On Delivery Guarantees of Face and Combined GreedyFace Routing in Ad Hoc and Sensor Networks,” Proc. ACM MobiCom ’06, pp. 390-401, Sept. 2006.

