ISSN: 2456-9348
Vol (02) _Issue (02) Impact Factor: 4.520

iJETRM
International Journal of Engineering Technology Research & Management

LANMAR: LANDMARK ROUTING FOR LARGE SCALE WIRELESS AD HOC NETWORKS ROUTES WITH FISHEYE STATE ROUTING

Rajeev Sharma[*1],
Umesh Sehgal[2]
[*1]A.P Chandigarh Engineering College, Landran,
[2]A.P, GNA University,Phagwara

ABSTRACT
In this paper, we tend to gift a completely unique routing protocol for wireless impromptu networks Landmark impromptu Routing (LANMAR). LANMAR combines the options of optical lens State Routing (FSR) and Landmark routing. The key novelty is that the use of landmarks for every set of nodes that move as a bunch (e.g., a team of work-mates at a convention or a tank battalion within the battlefield) so as to scale back routing update overhead. Like in FSR, nodes exchange link state solely with their neighbors. Routes at intervals optical lens scope a correct, whereas routes to remote team of nodes a "summarized" by the corresponding landmarks. A packet directed to a far off destination at the start aims at the Landmark; because it gets nearer to destination it eventually switches to the correct route provided by optical Fisheye state

Keywords:
Landmark routing, LANMAR

INTRODUCTION

As the wireless and embedded computing technology continues to advance, increasing numbers of portable computing and communication devices will be capable of tetherless communications and ad hoc wireless networking. An ad hoc wireless network is a self-organizing and self-configuring network which does not rely on a fixed infrastructure and has the capability of rapid deployment in response to application needs. Ad hoc networks are very attractive for tactical communication in military and law enforcement. They are also expected to play an important role in civilian forums such as convention centers, conferences, and electronic classrooms. Node mobility, potentially very large number of nodes, and limited communication resources (e.g., bandwidth and power) make routing in ad hoc networks extremely challenging.

In particular, the routing protocols for ad hoc wireless networks must quickly adapt to frequent and unpredictable topology changes and must be parsimonious of communications and processing resources. Existing wireless routing schemes can be classified into two categories according to their design philosophy: (a) proactive (e.g., distance vector or link state based); and (b) reactive (e.g., on demand). Proactive schemes compute global routes in the background. Historically, the first routing scheme used in the early packet radio network, PRNET, was a proactive, distance vector type [5]. The distance vector approach is simple but in a mobile scenario it suffers from slow convergence and tendency of creating loops. These problems can be resolved by the Link State (LS) approach, which is widely used in wired.

In general, when wireless network size and mobility increase (beyond certain thresholds), current "flat" proactive routing schemes (i.e., distance vector and link state) become all together unfeasible because of line and processing O/H. In some application domains(e.g., automated battlefield) the scalability of a wireless ad hoc network is achieved by designing a hierarchical architecture with physically distinct layers (e.g., pointto-point wireless backbone, UAVs and satellites). In other application (e.g., sensor networks), however, such physical hierarchy is not cost-effective. Thus, it is important to find solutions to the scalability problem of an homogeneous ad hoc network strictly using scalable routing protocols. One way to solve this problem in the routing domain is hierarchical routing. A hierarchical version of link state called HSR (Hierarchical State Routing) [19], [20] has proven to be quite effective in large wireless networks [12]. HSR, however, requires complex bookkeeping of hierarchical addresses in the face of mobility. A much simpler version of Link State with hierarchical "flavor" is Fisheye State Routing (FSR) [21], [12]. FSR uses the "fisheye" technique (first proposed by Kleinrock and Stevens [14] for visual displays) to reduce routing update overhead. In FSR, each node progressively slows down the update rate for destinations as their hop distance increases. Entries corresponding to nodes within a smaller scope are propagated to neighbors with a higher frequency. As a result, a considerable fraction of topology table entries (corresponding to remote destinations) are suppressed in a

iJETRM
International Journal of Engineering Technology Research & Management

typical update, thus reducing line overhead. This approach produces accurate distance and path quality information in the immediate neighborhood of a node, with progressively less detail as the distance increases.

In general, on demand routing exhibits low line and storage O/H even in very large networks as long as mobility is low and traffic is light and is directed to a few destinations. In a very dynamic traffic and mobility pattern however with many different destinations, the repeated route discovery can lead to high overhead. In fact as mobility increases, the precomputed route may break down, requiring repeated route discoveries on the way to destination. Route caching becomes ineffective in high mobility and with increasing number of destinations. Since flooding is used for query dissemination and route maintenance, routing control O/H tends to grow very high [4]. In the case of 100 nodes and 40 sources with uniform traffic pattern, the results in [4] show that both DSR and AODV generate more routing overhead than actual throughput. Similar findings are reported in [12]. Finally, since a route has to be entirely discovered prior to the actual data packet transmission, the initial search latency may impact the performance of interactive applications (e.g., distributed database queries). In multimedia traffic scenarios requiring QoS guarantees, another type of limitation arises. With on demand route discovery, it is impossible to know in advance the quality of the path (e.g., bandwidth, delay, etc) prior to call setup. Such a priori knowledge (which can be easily obtained from proactive schemes) is very desirable in multimedia applications, as it enables effective call acceptance control without probing the network each time.

Fisheye State Routing (FSR) [4] protocol is a proactive (table driven) ad hoc routing protocol and its mechanisms are based on the Link State Routing protocol used in wired networks. FSR is an implicit hierarchical routing protocol. It reduces the routing update overhead in large networks by using a fisheye technique. Fisheye has the ability to see objects the better when they are nearer to its focal point that means each node maintains accurate information about near nodes and not so accurate about far-away nodes. The scope of fisheye is defined as the set of nodes that can be reached within a given number of hops.

Traffic Pattern and Mobility Models in Fisheye state

The source-destination pairs are randomly selected over the network. Their number is varied in the experiments to change the offered load. Traffic is UDP. The interarrival time of the data packets on each source/destination connection is 2.5 seconds. This is a reasonable model of an interactive environment. The size of the data payload is 512 bytes. The load in the network is increased by increasing the number of connections (each with fixed traffic rate), instead of keeping the number of connections constant and increasing the rate on each connection as previously done in [4]. This is a departure from previous simulation studies [4], [3], [6] which focused on performance evaluation for small number of traffic pairs (up to 40 pairs) each with relatively high data rate (3 - 4 pkts/sec). The mobility model is the Reference Point Group Mobility model [10] applied to a square field. Each node in a group has two components in its mobility vector: the individual component and the group component. The individual component is based on the random waypoint model [7], [3]. A node randomly picks a destination within the group scope and movestowards that destination at a fixed speed. Once the node reaches the destination, it selects another destination randomly and moves towards it after a 10-second pause time. This behavior is repeated for the duration of the simulation. The speed varies between 2 and 10 m/sec. Pause time is not considered in computing node speed. The group component of mobility is also based on the random waypoint model. In this case, however, the destination is an arbitrary node in the entire system. We use a relatively short pause time of 10 seconds to force the topology change quite dynamically and thus challenge the routing algorithms. C. Performance Metrics We have used the same metrics as proposed in [4] to compare protocol performance, namely:

Packet delivery fraction –: The ratio between the number of received data packets and those originated by the sources.

Average end-to-end packet delay –: The time from when the source generates the data packet to when the destination receives it. The delay includes: route acquisition latency, processing delays at various layers of each node, queuing at the interface queue, retransmission delays at the MAC, propagation and transfer times.

Normalized routing load –: The number of routing control packets transmitted per data packet delivered at the destination. Each hop-wise transmission of a routing control packet is counted as one transmission.

Throughput –: The actual throughput achieved to destination. The first two metrics reflect the routing effectiveness of a protocol and are the most important metrics for best effort traffic. The routing load metric shows the routing control penalty involved in delivering data. These metrics are not independent.

Entries corresponding to nodes within the smaller scope are propagated to the neighbors with the highest frequency and the exchanges in smaller scopes are more frequent than in larger. That makes the topology information about near nodes more precise than the information about far away nodes. FSR minimized the

iJETRM
International Journal of Engineering Technology Research & Management

consumed bandwidth as the link state update packets that are exchanged only among neighboring nodes and it manages to reduce the message size of the topology information due to removal of topology information concerned far-away nodes. Even if a node doesn't have accurate information about far away nodes, the packets will be routed correctly because the route information becomes more and more accurate as the packet gets closer to the destination. This means that FSR scales well to large mobile ad hoc networks as the overhead is controlled and supports high rates of mobility.

FSR is a link-state routing protocol, thus it is made of three tasks:

[1] Neighbor Discovery: every node sends an HELLO message every δ seconds to its one-hop neighbour, in order to establish and maintain neighbour relationships.
[2] Information Dissemination: every node disseminates Link State Announcements messages (LSA) every Δ seconds (with Δ > δ), that contain neighbour link information, to all other nodes in the network.
[3] Route Computation: from the information contained in the LSA messages the node can reconstruct the whole network topology and use Djiksta's algorithm to compute the routes to any node in the network.

CONCLUSIONS

In this paper, we have proposed a new routing scheme, Landmark Ad hoc Routing (LANMAR). LANMAR is an extension of Fisheye Routing which exploits group mobility by "summarizing" the routes to the group members with a single route to a landmark. Moreover, LANMAR provides a dramatic reduction in route table storage overhead with respect to FSR. As for the comparison with the popular on demand schemes, we have shown that when the number of communication pairs increases, AODV and DSR will generate considerable routing overhead. Because of this increase in routing O/H, the performance of both AODV and DSR is worse than LANMAR for medium to high traffic loads. Apart from being effective in group mobility scenarios, LANMAR is robust to shifts in mobility pattern. Even if all nodes move independently (i.e., isolated mobility pattern) LANMAR performs no worse than FSR. Moreover, if the notion of "designated" landmark (i.e., Home Agent) is introduced, the routing storage requirement is much more scalable than in FSR, at a cost of delay increase and throughput reduction. Work is now in progress towards refining many features of the basic LANMAR scheme proposed here. We are working on an algorithm for automatic election of the Landmark nodes. We are also evaluating various alternatives for handling the situations when there is a large fraction of isolated nodes.

REFERENCES

[1] The ATM Forum, "Private Network-Network Interface Specification v1.0," 1996.
[2] R. Bagrodia, R. Meyer, M. Takai, Y. Chen, X. Zeng, J. Martin, and H.Y. Song, "PARSEC: A Parallel Simulation Environment for Complex Systems," IEEE Computer, vol. 31, no. 10, Oct. 1998, pp.77-85.
[3] J. Broch, D.A. Maltz, D.B. Johnson, Y.-C. Hu, and J. Jetcheva, "A Performance Comparison of Multi-Hop Wireless Ad Hoc Network Routing Protocols," In Proceedings of ACM/IEEE MOBICOM'98, Dallas, TX, Oct. 1998, pp. 85-97.
[4] S.R. Das, C.E. Perkins and E. M. Royer, "Performance Comparison of Two On-demand Routing Protocols for Ad Hoc Networks", In Proceedings of IEEE INFOCOM 2000, Tel Aviv, Israel, Mar. 2000, pp. 3-12.
[5] J. Jubin and J.D. Tornow, "The DARPA Packet Radio Network Protocols," Proceedings of the IEEE, vol. 75, no. 1, Jan. 1987, pp. 21-32.
[6] P. Johansson, T. Larsson, N. Hedman, B. Mielczarek and M. Degermark, "Scenario-based Performance Analysis of Routing Protocols for Mobile Ad-hoc Networks," In Proceedings of ACM/IEEE MOBICOM'99, Aug. 1999, pp. 195-206.
[7] D.B. Johnson and D.A. Maltz, "Dynamic Source Routing in Ad Hoc Wireless Networks," In Mobile Computing, edited by T. Imielinski and H. Korth, Chapter 5, Kluwer Publishing Company, 1996, pp. 153-181.
[8] Z.J. Haas, "A New Routing Protocol for the Reconfigurable Wireless Networks," In Proceedings of IEEE ICUPC'97, San Diego, CA, Oct. 1997, pp. 562-566.
[9] Z.J. Haas and M. R. Pearlman "Determining the Optimal Configuration for the Zone Routing Protocol," In IEEE Journal on Selected Areas in Communications, Aug. 1999, pp. 1395-1414.
[10] X. Hong, M. Gerla, G. Pei, and C.-C. Chiang "A Group Mobility Model for Ad Hoc Wireless Networks,"In Proceedings of ACM/IEEE MSWiM'99, Seattle, WA, Aug. 1999, pp.53-60.

ISSN: 2456-9348
Vol (02) _Issue (02) Impact Factor: 4.520

IJETRM
International Journal of Engineering Technology Research & Management

[11] IEEE Computer Society LAN MAN Standards Committee, Wireless LAN Medium Access Protocol (MAC) and Physical Layer (PHY) Specification, IEEE Std 802.11-1997. The Institute of Electrical and Electronics Engineers, New York, NY, 1997.
[12] A. Iwata, C.-C. Chiang, G. Pei, M. Gerla, and T.-W. Chen, "Scalable Routing Strategies for Ad-hoc Wireless Networks," In IEEE Journal on Selected Areas in Communications, Aug. 1999, pp. 1369-1379.
[13] E.D. Kaplan (Editor), Understanding the GPS: Principles and Applications, Artech House, Boston, MA, Feb. 1996.
[14] L. Kleinrock and K. Stevens, "Fisheye: A Lenslike Computer Display Transformation," Technical report, UCLA, Computer Science Department, 1971.
[15] Y.-B. Ko and N.H. Vaidya, "Location-Aided Routing (LAR) in Mobile Ad Hoc Networks," In Proceedings of ACM/IEEE MOBICOM'98, Dallas, TX, Oct. 1998, pp. 66-75.
[16] S.-J. Lee, W. Su, and M. Gerla, "Ad hoc Wireless Multicast with Mobility Prediction," In Proceedings of IEEE ICCCN'99, Boston, MA, Oct. 1999, pp. 4-9.
[17] J. Moy, "OSPF Version 2," In IETF RFC 1583, 1994.
[18] V.D. Park and M.S. Corson, "A Highly Adaptive Distributed Routing Algorithm for Mobile Wireless Networks," In Proceedings of IEEE INFOCOM'97, Kobe, Japan, Apr. 1997, pp. 1405-1413.
[19] G. Pei, M. Gerla, X. Hong, and C.-C. Chiang, "A Wireless Hierarchical Routing Protocol with Group Mobility," In IEEE WCNC'99,New Orleans, LA, Sep. 1999, pp.1536-1540.
[20] G. Pei and M. Gerla, "Mobility Management in Hierarchical Multi-hop Mobile Wireless Networks," In Proceedings of IEEE ICCCN'99, Boston, MA, Oct. 1999, pp. 324-329.
[21] G. Pei, M. Gerla and T.-W. Chen, "Fisheye State Routing in Mobile Ad Hoc Networks," In Proceedings of the 2000 ICDCS Workshops, Taipei, Taiwan, Apr. 2000, pp. D71-D78.
[22] C.E. Perkins and E.M. Royer, "Ad-Hoc On-Demand Distance Vector Routing," In Proceedings of IEEE WMCSA'99, New Orleans, LA, Feb. 1999, pp. 90-100.
[23] M. Takai, L. Bajaj, R, Ahuja, R. Bagrodia and M. Gerla, "GloMoSim: A Scalable Network Simulation Environment," Technical report 990027, UCLA, Computer Science Department, 1999.
[24] C.-K. Toh, "Associativity-Based Routing For Ad Hoc Mobile Networks," Wireless Personal Communications Journal, Special Issue on Mobile Networking and Computing Systems, Kluwer Academic Publishers, vol. 4, no. 2, Mar. 1997, pp. 103-139.