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Girdle Based Transmission In Manets

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Abstract

The Increasing Challenges In MANET (Mobile Adhoc Network) Such As Multicast Packet Forwarding, Crew Maintenance And The Path Structure Over The Dynamic Topology Arises As The Size Of The Network Increases. The Topographic Locatable Multicast Protocol (TLMP) Proposed In This Paper Is To Resolve The Issues That Is Being Faced In Large Size MANET's. The Virtual Tree Structure Used In The Protocol Without Need Of Maintaining State Information For More Crew Management And Packet Forwarding In The Dynamic Network Due To Unstable Node Movements. The Scalable And Efficient Crew Is Managed Through Virtual Tree Structure And The Position Of The Node Is Managed Through The Crew Management. The Message Information And Data Packets Are Forwarded Along The Virtual Tree Paths, But There Is No Need To Explicitly Create And Actively Maintain A Structure. This Virtual Structure Efficiently Reduces The Tree Management Overhead And Support The Transmissions.The Periodic Source Information Is Avoided And Efficient Source Tracking Mechanism Is Designed Using The TLMP. The Null-Girdle Problem Is Handled By Using The BPRT (Back Pressure Restoration Technique) Algorithm. It Induces The Empty Packets To Flow In The Network Where The Link Break And Transmission Failures Are Identified.

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I. INTRODUCTION

The increase in interest with the usage of MANETs [1], [2] grows in rapid speed of computational techniques and wireless networking techniques.The wireless devices in the MANET could configure itself and forms a structure as a network with the dynamic topology. The topology changes continuously as the nodes joins and leaves the crew. It works in a standalone fashion so that each node in the network acts itself as a router. The mobile adhoc network becomes a common hub for many researchers and various studies are made with the new technologies being created in this field. The researchers concentrated to increase performance and support wide variety of applications in it.The fundamental service for supporting the data exchange between the nodes is Multicasting. It provides information and performs the collaborative [3] task execution among the nodes that is present in the network. The multicast service in MANET's is often required to handle the operations of the large data transmission and huge networks. Since the MANET follows the dynamic topology it poses the large difficulty in designing a reliable and scalable multicast protocol in the presence of dynamic topology.

Many efforts have been put together to develop the multicast routing protocols for MANETs. The protocols that involved in developing the multicast protocols are conventional tree based protocols and mesh based protocols [7]. The tree protocols manage the construction of tree structure for the best efficient multicast packet delivery and it utilizes the network resources efficiently. Even though the tree protocols functions properly it is very difficult to maintain the tree structure in MANET and the tree connection is easy to break and the transmission is not reliable. The mesh based protocols enhance the robustness with the use of redundant paths between the source and set of multicast members, which incurs a higher forwarding overhead.It is critical to reduce the states to be maintained by the network to support more reliable and scalable transmission. The routing is also being impacted with transmission as the network size grows. So, the location based multicast protocols [4],[5],[6], have been proposed for MANET. The main concept proposed here is that the mobile nodes are aware of their own positions through certain positioning system like (e.g. GPS) and make use of Topographic routing [8]to transmit packets along the multicast trees.In such protocols, a multicast packet carries the information of the information of the entire tree. So, there is no need to distribute the routing states [9] in network. These protocols are more robust than that of the conventional based multicast schemes. As the size of the network increases the size of the packet also increases with the header size as it traverses through many nodes [21]. So it makes theses protocols to be used only for the small multicast crews. There is need to efficiently manage the membership [10] of a potentially large crew, determine the node positions, efficiently manage the crew members and transmit packets in a large crew of nodes [21] . The existing small crew Topographic location based multicast protocols normally address only part of these problems. In this paper the Topographic Locatable Multicast Protocol (TLMP) is proposed, which can scale to a large crew size and network size and provide robust multicast packet transmission in a dynamic mobile adhoc network environment. The protocol is designed to simple, so that it can operate more efficiently and reliably. The Virtual Tree Path structure is introduced for more robust and scalable crew management and packet forwarding in the presence of high network dynamics due to unstable wireless channels and frequent motion. The information brokrn into packets and control information will be transmitted along efficient tree-like route; however, different from other protocols. So that a robust virtual tree based structure can be formed during packet forwarding with the information provided by the nodes.

The TLMP makes use of node position information to support reliable data forwarding. The protocol is designed to be versitile and self configurable. Instead of addressing only a specific part of the issue, it introduces a girdle based scheme to efficiently handle the crew management, and takes advantage of the crew management structure to efficiently track the locations of all the Crew members without resorting to any data. The girdle structure is also formed virtually and the girdle where a node is located can be calculated based on the node position and a reference origin. The concept of Root Home is introduced to track positions and addresses of all the sources in the network.

In general the contributions in this work include

[1] Proposing stateless distribution schemes that data packets and control messages can be sent along efficient virtual-tree paths without the need of explicitly building and maintaining a tree structure as in conventional tree-based protocols. This greatly reduces the congestion and increases the reliability and scalability of the protocol

[2] Making use of the position information to design a scalable and reactive Girdle-based scheme for efficient crew management, which allows a node to join and leave a crew effectively without loss of packets

[3] Providing effective position hunt of multicast crew members, by combining the location service with the membership management to avoid the need and overhead of using a separate location server.

[4] Introducing a Root Home to track the addresses and positions of the sources, to avoid network-wide periodic flooding of source information.

[5] Drafting a layout to take care of the empty Girdle problems for both member Girdles and the Root Home, which are critical in designing a Girdle based protocols with Girdles as the neighbourhood locations.

[6] Making a detailed quantitative analysis of the per node congestion of and carry out thorough simulations to show the scalability and robustness of the protocol

In the next section of the paper it deals with the related work on MANET multicast related protocols. In the second section the detailed design of the TLMP
protocol is explained and in third section the additional issues to be considered are discussed and the fourth section holds the conclusion part.

II. RELATED WORKS

The summarization of the basic procedures assumed in conventional multicast protocols. The conventional topology based multicast protocols include tree-based protocols (e.g., [11], [12], [13], [22]) and mesh based protocols (e.g., [14], [15], [23). The tree based protocols construct a tree structure for more efficient forwarding of packets to all the crew members. The Hybrid topology based protocols expand a multicast tree with additional paths that can be used to forward the transmitted multicast data packets when the links get break. The topology based protocols generally will possess the following three inherent components that make them difficult to scale:

- Crew Membership management: The crew membership changes frequently as each node may join or leave a multicast crew randomly, and the management becomes harder as the crew size or network size increases.
- Creation and maintenance of a tree- or mesh-based multicast structure: The tree-based structures are difficult to maintain in the presence of the movement of nodes and the change of multicast crew membership, while the mesh-based protocols accomplish robustness at the cost of extra network resource consumption
- Multicast packet forwarding. The multicast packets are forwarded along the predefined tree structures, which are prone to wreck over the dynamic topology in a large network with longer paths.

- The Construction and maintenance of the conventional tree or mesh structure involve high control overhead over a dynamic network [16], [23]. The TLMP uses a location aware approach for more reliable crew membership management and packet transmissions.

- Besides the three components included in conventional topology-based protocols, a Topographic multicast protocol needs a location service to obtain the positions of the members [17], [22], [23]. The Topographic multicast protocols [21] needs to put the information of the entire tree or all the destinations into packet headers. These packet headers then create a big header overhead when the crew size is large.

- The scalable Position-Based Multicast protocol [18], [19], [20] are more related to our work, as the two share the essence as TLMN in improving the scalability of location-based multicast by using hierarchical crew management.

III. TOPOGRAPHIC LOCATABLE MULTICAST PROTOCOL

In the section the TLMP protocol is described. It supports a two-tier membership management and forwarding structure. A Girdle structure is built in the lower tier based on information and a head is elected on demand when a Girdle has crew members. The Girdle head allotted in the Girdle collects all the details of the Girdle nodes. In the upper tier the heads of the member Girdles report the Girdle membership to the sources directly along a virtual reverse-tree-based path. If a head is ignorant of the source, it could obtain the information from the root home. Many issues need to be addressed to make the protocol fully working. The issues related to Girdle management include: the strategy for electing a Girdle head on demand and maintaining the Girdle mobility, the handling of empty-Girdle problem, and the scheme for Root-Home construction and maintenance, and then need to reduce packet loss during node moving across Girdles.

3.1 Girdle Creation

In TLMN, the Girdle structure (Fig. 1), is virtual and calculated based on a reference point.Therefore, the construction of Girdle structure does not depend on the shape of the network region and it is very simple to locate and maintain a Girdle. To further reduce congestion, a Girdle needs to elect a head and be managed only when it has multicast crew members.

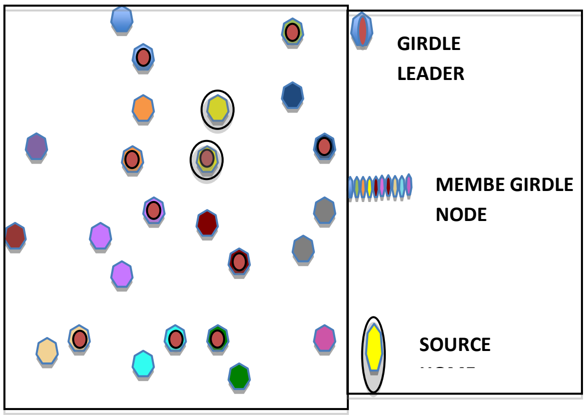


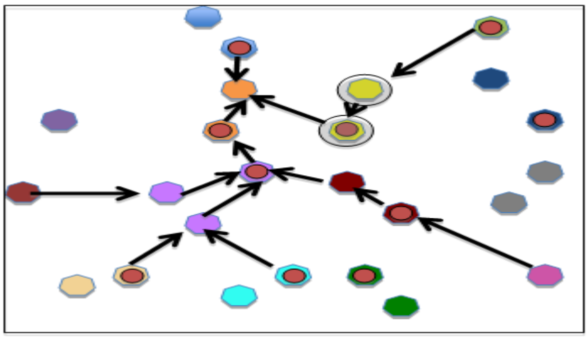
Fig1. A Reference Girdle structure used in TLMN

A node can calculate its zID (a, b) from its pos (x, y) as follows:
a={(x-x0)/Girdle size};
b={(y-y0)/Girdle size};
With center position (xc, yc) GirdleId (a,b) can be calculated as:

xcenter=1/4*x0 +(a + 0.5)* Girdle size;
ycenter=1/4*y0 +(b + 0.5)* Girdle size:

3.2 Crew Authentication and management

The crew membership is first aggregated in the local Girdle and managed by the leader. When tagging or untagging from a crew, a member M sends a message REFRESH (crewIDs, posM) immediately to its Girdle leader to notify the change in crew membership, The position and crew address is represented as posM and crewIDs . The crew member M also needs to send a



REFRESH message to its Girdle leader at every time interval

Fig 2. The aggregation of REPORT messages and the virtual reverse tree formation

As compared to local messages, control messages sent at the network tier would generally traverse a long distance. To minimize congestion we make use of an aggregation scheme (Fig. 2), which reduces control overhead by aggregating the control messages sent to the same destination.

3.3 To Begin A Session

All nodes in a MANET, the source also moves. Authentication to join or leave a crew requires the information of the source. It is very necessary to track down the source when needed and find its location . TLMN incorporates mechanisms for session creation and efficient source discovery. A multicast session (G) is initiated and terminated by a source (S). To start a multicast session, S floods an ANNOUNCE (S, posS, crewIDs) message into the network , where crewIDs are IDs of the crews (G is one of them) for which S is the source.

3.4 Dilivering Packets

A source needs to send the multicast packets reliably to the members. The source keeps track of all the member Girdles and the Girdle leader keeps track of the local members. A virtual tree like path is used to send Multicast packets from the source to the girdle members and from the girdle leader to crew members. A tree is formulated virtually during transmission time and guided by the destination positions.

3.5 Back Pressure Restoration Technique

The problem of the link failure in the system must be eliminated. This will cause degradation in the QoS (Quality of Service) in the system as well as pull down the performance of the system .To deal with this problem Back Pressure Restoration Technique (BPRT) is used. The BPRT is used to intimate the failure to the sender so that it will stop sending the message until the link failure is restored / recovered by using another alternative path. Once the path is recovered or restored either by a new path or by the original path, the sender is soon informed and the sender will start to send messages again.

In order to select paths and alternate paths from source to destination the following rules are to be followed.

RULE 1: IF THE PATHS ARE OF SAME DIFFERENCE, THEN

[1] Distance of selected path and the load on the selected path is minimum.
[2] The load on the in between nodes is greater than the opening bandwidth
[3] The distance to reach the destination using the in between nodes is the lowest.

RULE2: IF ADDITIONAL PATH'S ARE OF SAME DIFFERENCE, THEN,

[1] If two paths of the same length is chosen then the path with least load is taken into consideration.
[2] If both the paths have the same load then choose one by any chance.

RULE 3: IF THE PATHS ARE NOT OF SIMILAR LENGTH, THEN

[1] Arrange the possible paths from the lowest to the highest value of load and distance.
[2] Take the sum of the distance of the nodes on the path in the list and finally select the path with lowest sum. If two or more paths have the same distance than Load > Distance of path is taken into consideration.

IV. CONCLUSIONS

In this paper, we have designed a Topographic Locatable Multicast Protocol. In TLMP stateless virtual transmission structures are used for simple management and vigirous data forwarding. The transportation of data and control messages are in the form of efficient tree-like paths without the need to maintain a structure.

Membership management is obtained through a virtual-Girdle-based two-tier architecture. A Root Home keeps track of locations and addresses of the multicast sources to avoid the periodic network-wide flooding of data, The tracking of crew members is combined with the membership management to avoid the use of an outside location server. The position information used in TLMN reduces congestion and leads to more robust multicast forwarding when there is a change in position. Empty-Girdle problem which is challenging for the Girdle-based protocols is handled and the link failure is also restored efficiently using Back Pressure Restoration technique.

REFERENCES:

[1] M.S. Corson, J.P. Maker, J.H. Cernicione, "Internet-based mobile ad hoc networking", IEEE Internet Computing3 (4) (1999) 63–70.
[2] S. Giordano, Mobile ad-hoc networks, in: I. Stojmenovic(Ed.),Handbook of Wireless networks and Mobile Computing, Wiley, NewYork , 2002.
[3] W. Wu, J. Cao, J. Yang, and M. Raynal, "Design and Performance Evaluation of Efficient Consensus Protocols for Mobile Ad Hoc Networks," IEEE Trans. Computers, Aug. 2007.
[4] S. Basagni, I. Chlamtac and V.R. Syrotiuk. Location aware, dependable multicast for mobile ad hoc networks. Computer Networks, 36(5-6):659- 670, August 2001.
[5] K. Chen and K. Nahrstedt. Effective location-guided tree construction algorithms for small crew multicast in MANET. In IEEE INFOCOM, pp. 1180-1189, 2002.
[6] M. Mauve, H. Fubler, J. Widmer and T. Lang. Position-based multicast routing for mobile ad-hoc networks. Poster section in ACM MOBIHOC, June 2003.
[7] Shuhui yang and Jie wu, New Technologies of Multicasting in Manet. Florida Atlantic University) pp. 215-234
[8] S. Wu and K.S. Candan, "GMP: Distributed Topographic Multicast Routing in Wireless Sensor Networks," Proc. 26th IEEE Int'l Conf. 2006.
[9] L. Ji and M.S. Corson, "Differential Destination Multicast: AMANET Multicast Routing Protocol for Small Crews," Proc. IEEE, Apr. 2001.
[10] I. Abraham, D. Dolev, and D. Malkhi, "LLS: A Locality Aware Location Service for Mobile Ad Hoc Networks," Proc. Workshop Discrete Algorithms and Methods for MOBILE Computing and Comm.
[11] (DialM), 2004.
[12] E.M. Royer and C.E. Perkins. Multicast operation of the ad hoc on- demand distance vector routing protocol. In MOBICOM, pages 207–218, August 1999.
[13] C. Wu, Y. Tay and C.-K. Toh. Ad hoc multicast routing protocol utilizing increasing id-numbers (AMRIS) functional specification. Internet draft, November 1998.
[14] X. Zhang and L. Jacob. Multicast girdle routing protocol in mobile ad hoc wireless networks. in Proceedings of Local Computer Networks, 2003 (LCN 03), October 2003.
[15] C.-C. Chiang, M. Gerla and L. Zhang. Forwarding crew multicast protocol (FGMP) for multihop, mobile wireless networks. AJ. Cluster Comp, Special Issue on Mobile Computing, 1(2):187-196, 1998.
[16] M. Gerla, S. J. Lee and W. Su. On-demand multicast routing protocol (ODMRP) for ad hoc networks. Internet draft, draft-ietf-manet-odmrp- 02.txt, 2000.
[17] J. J. Garcia-Luna-Aceves and E. Madruga. The core-assisted mesh protocol. IEEE JSAC, pp. 1380-1394, August 1999.
[18] C. Gui and P. Mohapatra. Scalable Multicasting for Mobile Ad Hoc Networks. In Proc. IEEE INFOCOM, Mar. 2004.
[19] J. Li, J. Jannotti, D.S.J.D. Couto, D.R. Karger, and R. Morris, "A Scalable Location Service for Topographic Ad Hoc Routing," Proc. MOBICOM, 2000
[20] I. Abraham, D. Dolev, and D. Malkhi, "LLS: A Locality Aware Location Service for Mobile Ad Hoc Networks," Proc. Workshop Discrete Algorithms and Methods for MOBILE Computing and Comm.
[21] (DialM), 2004.
[22] M. Mauve, H. Fubler, J. Widmer, and T. Lang, "Position-Based Multicast Routing for Mobile Ad-Hoc Networks," Proc. ACMMOBIHOC, Poster Section, June 2003.
[23] X. Xiang, Z. Zhou, and X. Wang, "Self-Adaptive On Demand Topographic Routing Protocols for Mobile Ad Hoc Networks ,"Proc. IEEE INFOCOM, May 2007.
[24] Jyoti M.Karbhal ,Kishor B Sadafale "Secure Efficient Topographic Multicast Protocol For Mobile AdHoc Networks," International Journal of P2P Network Trends and Technology Volume3 Issue 1 2013
[25] Dhillon, H.; Ngo, H.Q., "CQMP: a mesh-based multicast routing protocol with consolidated query packets," Wireless Communications and Networking Conference, 2005 IEEE , vol.4, no., pp.2168,2174 Vol. 4, 13-17 March 2005