A SURVEY ON EFFECTIVE DISSEMINATION OF PACKETS STRATEGIES IN MULTIHOP WIRELESS ADHOC NETWORKS

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Abstract
Today new technologies were introduced for the comfort of people to manage their data ubiquitously. But in Adhoc Networks there were several issues arises in real time access. Normally mobile devices are contrary to virtual reality, it pushes computing devices work with people anywhere and anytime. Further it's infrastructure less and licenses free for individual product. One of the major drawbacks in Adhoc Network is related to optimization of bandwidth, because of Uniqueness of the model, effective dissemination of packets in multihop wireless adhoc networks with the objective to minimize the operational expense associated with it. In this paper, various techniques for packet distribution are discussed in detail. This paper would benefit both Adhoc network users and research scholars in overcoming the challenges faced.

Keywords:
Adhoc Networks, Time to Live, Signal to Interference Noise Ratio

1. INTRODUCTION

A Comprehensive survey on various techniques of Adhoc Networks for an effective dissemination of packets in multihop wireless, to minimize bandwidth utilization and end to end delays. Node movement from source to destination uses multi hop data packet for unicasting and multicasting [2]. The routing protocol used for multicasting is ODMRP [6] and unicasting is AODV [7]. These protocols design and their layer operations are explained in this paper. It provides a brief description of how the data can be transferred from one node to another and how the channel access takes place. From the survey, the proposed solution attains better performance by having different metrics to reduce packet loss or delay.

In the real world there are two factors to be considered such as bandwidth and battery power of router. This paper mainly focus on bandwidth and how it can be utilized to transfer the packets in multihop wireless adhoc networks, the bandwidth utilization for private over large extent is not possible, because bandwidth allocation are in the hands of service providers such as Vodafone, Aircel, Airtel. For large amount of data transfer with less energy and time consumption we need advanced model of high speed routers. Today routers uses large amount of energy to route data leading to operational expense.

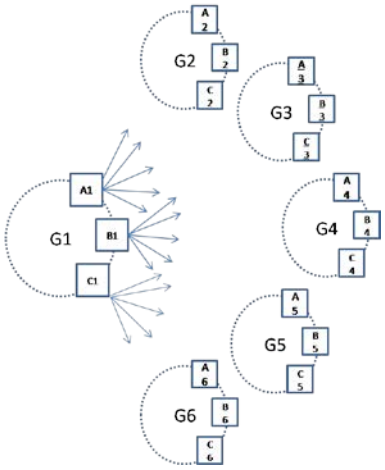

Fig. 1. Six Multicast Groups with three active sources

According to Gracia-Luna-Aceves, they considered six multicast groups with three concurrent active sources per multicast group. As in simulation experiment, they considered three sources A, B and C. One of these source is defined as real time and the other two are elastic, the real-time source selection is random. In these experiments, sources are also a group member, which favors ODMRP [6]. While in multicasting, they have five concurrent Constant bit rate flows among nodes that are randomly selected from nodes which does not belongs to multicast nodes. As in simulation experiment, group members adopts the group mobility model within 900x900 meter square, the remaining nodes moved based on the random waypoint model.

This section describes the technologies adopted for an effective dissemination of packets in multihop wireless adhoc networks to optimize the available bandwidth. Section 2 describes the Significance of Bandwidth Optimization. Section 3 describes Network Planning. Section 4 describes Channel Access and Hop Optimization. Section 5 describes Optimization of Hello Messages and Packet dissemination.

2. SIGNIFICANCE OF BANDWIDTH OPTIMIZATION

With limited capacity and increasing of bandwidth is highly impossible to meet the demand and also the bandwidth expense is high. Though the present bandwidth capacity is available at maximum and the future load is at high demand and high value. The only way to solve this demand is by effective management of bandwidth. A survey report of AITCS says that 59% of existing bandwidth is yet to be formulated [11].

From figure 1 the number of multicast groups is increased from one to six with three concurrent active sources per multicast group. As in simulation experiment [8], three sources were observed one as real time and the remaining two are elastic, and the selection mode is said to be random. In these experiments, sources are also a group member, which favors ODMRP. Many networks are connected with larger ones. The attitude focusing not only on networks changed but also on applications available over large extent.

3. NETWORK PLANNING

Network planning involves a series of measuring the current traffic flow in network, predicting the future needs and to determine the optimal allocation of resources. The main objective is to minimize aggregate congestion and operating in a limited bandwidth. In order to carry the forecast traffic loads the following attributes such as Network coding, Physical layer broadcasting, Traffic dependent physical states to be considered.

The physical layer and MAC layer resource allocation, minimizing the operating expense were explained in paper [1]. It provides a detailed description of how to allocate the resource in both physical and medium access layer. At the physical layer for resource allocation they use capacity graph. It can be used as interface between lower layers and upper layers. An elementary capacity graph represents the physical state corresponding to an arrangement of concurrently active links between neighbors. The Mac layer (link layer) uses time sharing between the elementary capacity graphs.

The Network layer transforms the end to end traffic demand into a link by link traffic demand compatible with supported capacity graph. The elementary capacity graphs can be calculated mainly by using Signal to Interference Noise Ratio (SINR). Then to find the maximum number of Flows and makes a simulation of max. Number of flows superimposes the different streams of information. For optimizing cost function uses two steps. They are Bandwidth Limited Regime and Refinement of Elementary Capacity Graph.

The network coverage and downloading speed are to be concerned while planning the adhoc networks construction. The node placement strategies & optimization techniques for increasing network coverage were discussed in [3]. Though UMTS offers HSDPA can provide up to max 10 mbps but downlink data rate is too slow due to path loss and fading. The author proposed a solution to overcome this problem is to use the ad-hoc relay network placement to provide uniform downlink data rate across the cellular space. It can connect two points in space with unequal data rates. The challenging task is how to improve the reception in a spot with poor coverage by relaying data from a spot with good coverage. The step followed to improve the cellular coverage is to find the minimum number of relay nodes. They consider the placement of node as NP-hard problem. Second step is a fixed number of relay nodes is to maximize the minimum HSDPA rate. Based on the good SINR condition, the peak rate of about 10.6 Mbps is achieved. While they make a comparison with greedy algorithm method along with their solution.

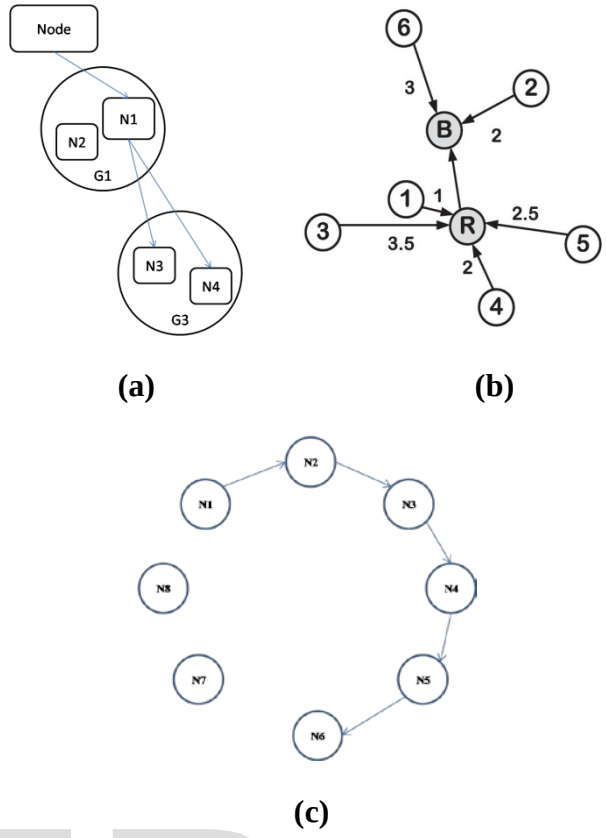

Fig.2. Node Placement Strategies
a)Optional Placement b) Greedy Placement c) Random Placement

The author in paper [3] describes the methodology about how the time slots are allocated. C/I scheduler to users with best signal quality. Mobile terminals use Round Robin Scheduler. Proportional fair scheduler tracks instantaneous SINR values with previous values. They adopt three relay node placement strategies such as optional placement, Greedy placement, Random placement. A comparison taken between these different node placement strategies and came to a conclusion that Greedy placement turns to be an effective one, because it shows it is a straight forward method for node placement and also it provides improvement in its capacity. From this paper it provides an observation that minimum number of nodes to achieve threshold and HSDPA throughput.

The physical layer broadcasts is used for supporting end to end multicast energy efficiently. The author says that the network coding and traffic dependent physical states provide more advantages for economically using wireless networks. The physical layer broadcast supports end to end multicast energy efficient and network coding provides more advantages over routing to minimize cost.

4. ACCESS CHANNEL AND HOP OPTIMIZATION

The Channel Access is based on MAC Protocol. In adhoc networks all the nodes which are present intermediate between the sender and receiver are considered as hop nodes. So hop

count is essential for an effective transfer of packets. The optimization of hop nodes and the relay node selection were described in paper [2]. The Main objective of this paper is to find a multi hop data packet forwarding from source to destination to understand node movement and link unreliability. The problem in wireless networks is its capacity.

In paper [2] they made an assumption that Node uses Successive interference Cancellation (SIC), Maximal Ratio Combining (MRC).It mainly deals with mutual Interference and to utilize all the received signal energy. SINR of a node is determined only by the nodes before, and not after along a packet forwarding path. The observation from their existing method is larger networks generate massive information for communication. Based on their observation, they provide idea to optimize the hop selection to maximize the transmission capacity. They make a wireless network model with a source and destination node. The packet transmission takes place between them via a 3-hop relaying path. In this paper for transmitting the packets between nodes, they find a problem of maximum optimization while they try to solve the problem of hop selection and capacity optimization. The hop optimization takes at source, destination and the node to be selected.

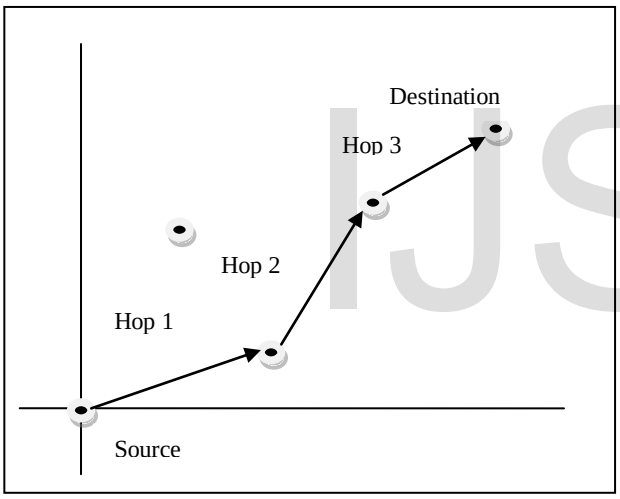

Fig. 3. A wireless network from source to destination uses 3-hop relaying path

Figure 3 show how the hop node can be selected for the transmission of packets from source to destination through 3 hop relaying node. They provide an algorithm to reduce the maximum problem into root finding problem. This paper uses Monte-Carlo simulation to verify their proposed method.

For security there were two main reasons to be considered such as identification of selfish nodes and the nodes which are available in the network has ability to transfer the packets without data loss. The identification of selfish nodes and its preventive mechanism can be explained in [10]. This paper focus mainly on secure channel access in Adhoc networks. They proposed an architecture called as Secure Architecture in Mobile Adhoc Networks. This Architecture uses three components such as IDs, nodes present in the network and intrusion detection mechanism for authentication. It explains about the prevention of selfish nodes in two ways such as eliminating the selfish nodes from the network and rejoining the eliminated selfish nodes by using the freshly regenerated id.

There were different types of potential attacks takes place when an id is assigned to a node or a device. The Server can be attacked. The Time Synchronization between nodes can be attacked and sometimes there will be a chance of denial of service attacks takes place. From their research they conclude that they need Certification Authority architecture for server and rare communication takes place between the nodes and the certification authority server. The generation of ids provides efficient mechanism for revocation.

According to Edward Li, the transmission capacity increases with hop count. Less energy to be used to combat mutual interference and also the routing table adopts soft state mechanisms with regular updation of node states.

5. OPTIMIZATION OF HELLO MESSAGES AND PACKET DISSEMINATION

To maintain updates routing table, the nodes should broadcast hello messages. A hello message occupies a part of bandwidth which leads to operational expense. The bandwidth can be effectively utilized by optimizing the hello messages [5].

In paper [5], they optimize the frequent needs of hello messages using a fuzzy logic system. The Problem identified in this paper is mobility of nodes, because in adhoc routing the efficiency depends on the rapid changes in topology. The solution they proposed to solve this problem by using fuzzy algorithm to record the rapid changes in topology measurements in time. The method proposed to solve this problem by improving the accuracy of neighborhood information and hence the overall network performance.

The steps followed in which how AODV protocol with fuzzy hello interval is

- To measure the effect of node transmission power on hello interval
- Rule base for fuzzy interval to be followed
- Identification of membership functions for fuzzy variables
- Perform fuzzification, interference and defuzzification
- Analyze the performance for the proposed hello interval

The fuzzy logic system is used to optimize the frequency of sending hello messages. A fuzzy comparison criterion is developed depending on the nodes transmission range and speed and used to decide the hello messages interval. The routing procedure developed has been simulated in the context of the AODV routing protocol. The work presented here provides knowledge about the configuration of adhoc network routing protocol parameters accurately and uses dynamic values.

A protocol to be adopted for packet transmission from one node to another, this can be explained in paper [4]. In this paper there were different strategies adopted for the selection of repeated data are presented and evaluated. The main objective of this paper is how effectively the packet to be transmitted from source to destination by using different flooding mechanisms.

The Problem identified in this paper is to solve either the network partitioning problem or its capability to handle large amount of data, but it cannot be done at the same time. The solution they provide to overcome this problem is by using hyper flooding strategy. In this paper an algorithm for updating replicated data on mobile nodes which is gathered by information provided by sensors. The metadata consists of object id, Time to Live, information. Mobile nodes maintain routing table for updating recent state of all objects, observed within a distinct area. The synchronized clocks to be used for the comparison of two or more nodes of the same object accurately. For forwarding the packets three different strategies adopted and make a comparison and choose the best algorithm which is fit for effective transmission

- Plain flooding
- Selective Flooding and Gossiping
- Hyper Flooding

Hyper-flooding can be adopted as one of the best method to overcome network partitions in ad hoc multicast routing rather than time to live (TTL) for a message. The selection strategy takes place by determining which data is re-advertised, for analyzing the performance of the protocol with respect to the propagation latency and the data transfer volume. It results shows there will be reduction in packet transfer from 30% to 40% when compared with other flooding approaches.

There were three different protocols adopted for better unicast and multicast routing. Some of the available protocols such as AODV, OLSR, ODMRP [6][7][8]. These three protocols were compared and its analyzing results were explained in [19]. This paper mainly focuses on interest defined mesh enclaves. They proposed a new architecture named PRIME (Protocol for Routing in Interest Driven Mesh Enclaves). It provides a better performance ratio when comparing with AODV, OLSR and ODMRP.

The Higher performance gain obtained is ODMRP because it uses soft state mechanisms. PRIME provides less communication overhead and delays but it never uses soft state. So they made a conclusion that ODMRP is best suitable for multicasting. Also the synchronization clocks is used for the packets to be transferred from source to destination with equal intervals of time.

6. CONCLUSION

Adhoc Networks technology is increasingly being used by each and every people in the world. In Mobile Paradigm, an effective dissemination of packets in adhoc networks is required for achieving minimum operational expense and utilization of available bandwidth. This paper summarizes the packet transfer and type of protocol to be adopted for effective dissemination. Some of the strategies discussed above mainly focusing on mechanisms for broadcasting packets. Hence this survey paper will hopefully motivate future researchers to come up with smarter and secured transfer of packets in adhoc networks to strengthen the Adhoc Networks paradigm.

FUTURE WORK

While considering the effective transmission of packets in multihop wireless networks the time intervals to be considered. Though fragmentation of packets takes place based on router configuration. There were large mechanisms for transmission of packets but the major risk present in the adhoc network is equal interval of time adopted based on packet size. The scope for maintaining efficiency should have equal intervals of time along with packet transmission of nodes in wireless adhoc networks.

REFERENCES

[1] Network planning in wireless Ad-Hoc networks - A cross layer approach (IEEE journal on selected areas in communication vol.28 no.1 january 2005)
[2] Hop Optimization and Relay Node Selection in Multi-Hop Wireless Adhoc Networks (State university of Newyork at Binghamton by Edward Li)
[3] Ad-hoc network planning for improving cellular data coverage. (NEC labs America,Princeton by Hung Yuwei,Samrat ganguly,Rauf Izmailov)
[4] A Protocol for Data Dissemination in Frequently Partitioned Mobile Ad Hoc Networks (Jörg Hähner*, Christian Becker, and Kurt Rothermel, Proceedings of INPROC 6,2003)
[5] Adaptive Optimizing of Hello Messages in WirelessAd-Hoc Networks - The International Arab Journal of Information Technology, Vol. 4, No. 3, July 2007
[6] On Demand Multicast Routing Protocol in Multihop Wireless mobile networks Sung-Ju Lee, William Su, Mario Gerla, Computer Science Department, University of California, Los Angeles, USA
[7] Adhoc on-Demand Distance Vector Routing, Charles E.Perkins & Elizabeth M.Royer 1999
[8] STORM: A Framework for Integrated Routing, Scheduling, and Traffic Management in Adhoc Networks, IEEE Transactions on Mobile Computing, Vol.11, No.8, August 2012, J.J. Gracia-Luna-Aceves and Rolando Menchaca-Mendez
[9] Securing Mobile Ad Hoc Network using Double Hash Authentication technique, International Journal of Advanced Information Science and Technology (IJAIST) ISSN: 2319:2682 Vol.11, No.11, March 2013, V.Mukundan, Dr.A.Rajaram, S.Gopinath
[10] Identification in Ad hoc Networks, Proceedings of the 39th Hawaii International Conference on System Sciences – 2006, Frank Kargl, Stefan Schlott, Michael Weber
[11] IAP Workshop: “Promoting access and capacity building for scientific information resources”- Dakar, Senegal, 30-31 January 2006
[12] F. Kargl, “Sicherheit in Mobilen Ad hoc Netzwerken,” Ph.D. dissertation, University of Ulm, Ulm, Germany, 2003, also available as http://medien.informatik.uni-ulm.de/~frank/research/dissertation.pdf.
[13] F. Kargl, A. Geiß, S. Schlott, and M. Weber, “Secure Dynamic Source Routing,” in Proceedings of the 38th Hawaii International Conference on System Sciences (HICSS-38), Hilton Waikoloa Village, HA, Jan. 2005.

[14] F. Stajano and R. Anderson, "The Resurrecting Duckling: Security Issues for Ad-hoc Wireless Networks," in Security Protocols, 7th International Workshop Proceedings, B. Christianson, B. Crispo, and M. Roe, Eds., 1999, pp.172–194.
[15] Galluccio L., Leonardi A., Morabito G., and Palazzo S., "Tradeoff Between Energy-Efficiency and Timeliness of Neighbor Discovery in Self-Organizing Ad Hoc and Sensor Networks," in Proceedings of the 38th Annual Hawaii International Conference on System Sciences (HICSS'05), USA, vol. 9, no. 9, pp.286.1-286.10, 2005.
[16] Jiang S., He D. and Rao J., "A Prediction-Based Link Availability Estimation for Mobile Ad Hoc Networks," in Proceedings of IEEE INFOCOM' 2001, Alaska, USA, vol. 3, pp. 1745-1782, April 2001.
[17] Lundgren H., Nordström E., and Tschudin C.,"Coping with Communication Gray Zones in IEEE 802.11b Based Ad Hoc Networks," in Proceedings of the 5th ACM International Workshop on Wireless Mobile Multimedia (WoWMoM'2002), Atlanta, Georgia, USA, pp.49-55, 2002.
[18] Perkins C. E., Royer E. M., and Das S. R., "Ad-Hoc On-Demand Distance Vector (AODV) Routing," available at: http://draft-ietf-manetaodv-13.txt (work in progress), February 2003.
[19] An Interest-Driven Approach to Integrated Unicast and Multicast Routing in MANETs Rolando Menchaca-Mendez, J.J. Garcia-Luna-Aceves - 1-4244-2507-5/08/$20.00 ©2008 IEEE
[20] S.-J. Lee, M. Gerla, and C.-C. Chiang. On-demand multicast routing protocol. In Proc. of the IEEE Wireless Comm. and Net. Conf., 1999. WCNC., pages 1298–1302 vol.3, 1999.
[21] S. Murthy and J. J. Garcia-Luna-Aceves. An efficient routing protocol for wireless networks. Mob. Netw. Appl., 1(2):183–197, 1996.
[22] C. E. Perkins and E. M. Royer. Ad-hoc on-demand distance vector routing. In Proc. of the Second IEEE Workshop on Mob. Comp. Syst.and App., 1999. WMCSA '99., pages 90–100, Feb 1999.