A SURVEY ON BROADCASTING PROTOCOLS IN MOBILE ADHOC NETWORKS

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Abstract: Adhoc Networks are self-organizing wireless networks, absent any fixed infrastructure. Nodes in such networks communicate through radio transmissions of limited range, requiring the use of intermediate nodes to reach a destination. Nodes in ad hoc networks are also limited in their power supply and wireless bandwidth. Node mobility further complicates the environment. Here transmitting information from source to destination through various intermediate nodes is a tedious task. To avoid loss of information, broadcasting of data through proper channel is essential. Various protocols are designed to avoid the loss of data. In this paper an overview of different broadcast protocols are discussed.

Keywords: Mobile Adhoc Network, transmitting (broadcast), protocols.

I. INTRODUCTION

A wireless network enables people to communicate and access applications and information without wires. This provides freedom of movement and the ability to extend applications to different parts of a building, city, or nearly anywhere in the world. Wireless networks allow people to interact with e-mail or browse the Internet from a location that they prefer. In recent days, Wireless network brings fundamental changes in Networks. Manet is one such network and it is a continuously self-configuring, infrastructure-less network of mobile devices connected wires. MANET is a developing area of research. Efforts have been taken for achieving efficient and reliable routing in mobile ad hoc networks.

The diagrammatic representation for broadcasting is shown in figure1 below.

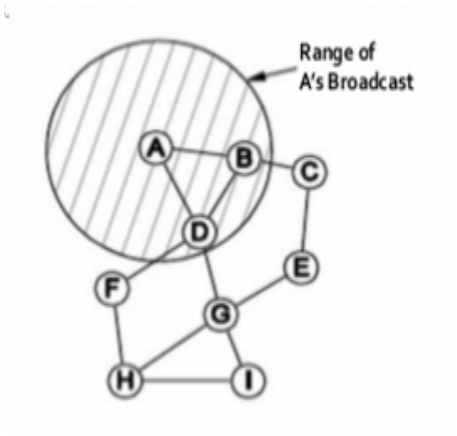

Figure1.Broadcast Operation

The routing protocols for MANET are divided into three major classifications like reactive protocols, Proactive protocols and hybrid.

In proactive routing protocols [5] the paths to all the destination nodes are determined at the start up, and maintained by using a periodic route update process. DSDV, GSR, FSR, STAR, DREAM is the examples for the proactive routing protocols.

In reactive protocols, paths are determined when they are required by the source using a route discovery process. AODV,DSR , ROAM , LMR, SSA , LAR , RDMAR , ARA , FORP , CBRP are the examples of reactive routing protocols[5]. Hybrid routing protocols are both reactive and proactive in nature. Each protocol has unique characteristics and examples are ZRP, ZHLS, SLURP, and DDR.

In this paper, different techniques used for broadcasting data in MANET were discussed.

II. LITERATURE SURVEY

This section defines the different broadcasting techniques employed in mobile adhoc networks and their issues during data routing from source to destination.

a) A simple improved distributed algorithm for minimum CDS in unit disk graphs.

Stefan,Alexander,Ulrich and Segal proposed a routing scheme in adhoc networks in such a way to construct a backbone based on minimum connected dominating set. This approach presents a very simple distributed algorithm for computing a small CDS. Backbone nodes in networks can perform efficient routing and broadcasting information. This approach assumes that time slots assignment to the nodes exists such that no two nodes transmit in the same time slot[4]. Coloring algorithm is used to determine such assignment.

The execution of this algorithm is divided into rounds and each round consists of three phases. In each phase a conflict–free time slot assignment is used and hence each node is able to transmit once.

This technique has a direct impact on the size of several CDS constructions and the relationship between the size of maximal independent set and a minimum CDS in unit disk graph is analyzed which yields better rounds for many other algorithms[4].

b) Stochastic Flooding Broadcast Protocols in Mobile Wireless Networks

Julien Cartigny, David Simplot and Jean Carle have proposed a paper “Stochastic Flooding Broadcast Protocols in Mobile Wireless Networks”. The information broadcast based on the flooding protocol in wireless communication environment leads to an overload of network bandwidth. So, each node has to obtain medium access and transmit its data. However, in dense network the collision probability is very high. In this paper, some improvements of the stochastic flooding protocols were proposed that aim to broadcast given information through the entire network efficiently [2]. The stochastic flooding protocols and its variants works based on five modes of stochastic approaches.

The main contributions of this paper are based on stochastic approach, topology adaptability, internal-node-based broadcasting algorithms and neighbor elimination scheme. The mode of flooding protocols may decrease the number of emitted packets and stochastic can offer good variety to generate multiple routes. Probabilistic Scheme gives also better use of energy and offers a better average use of the battery.

c) Color-Based Broadcasting for Ad Hoc Networks

Alireza Keshavarz-Haddad, Vinay Ribeiroz and Rudolf Riedi have proposed a paper “Color-Based Broadcasting for Ad Hoc Networks”. This paper presents a color-based broadcast technique for wireless ad hoc networks where for each forwarding of the broadcast message a unique color is assigned from different set of colors. The message is forwarded by the node only if a color is assigned from color set which it has not already overheard after a random time.

In the closely related counter-based broadcast scheme the number of broadcasts is counted by a node but the colors overheard are not counted. The forwarding nodes form a backbone, which is determined by the random timers[3]. The color-generated backbone nodes exhibit a connectivity graph richer than the counter-based ones. The different color shows geometric properties of the backbones which proves that the sizes of both color- and counter-generated backbones are within a small constant factor of the

optimum. Two techniques, boosting and edge-growing, are proposed that improve the performance of color and counter based broadcast in terms of reachability and number of rebroadcasts.

d) SLAW: A Mobility Model for Human Walks

Kyunghan Lee (KAIST), Seongik Hong (NCSU), Seong Joon Kim (NCSU), Injong Rhee (NCSU) and Song Chong (KAIST) have proposed a paper, "SLAW: A Mobility Model for Human Walks". In mobile networks, the movement patterns of mobile holders decide the performance of networking applications. The humans have control of mobility and such mobile networks are simulated by their mobility patterns. Simulation tools are used to deploy real mobile networks and can be used for performance evaluation. This paper presents a new mobility model, called Self similar Least-Action Walk (SLAW), which produces synthetic mobility traces. SLAW acts as an important tool for matching human walk behaviors and it can be applied in traffic predications and biological virus spread evaluation where human mobility traces are important.

SLAW needs only a few input parameters such as the walk-about area size, the number of walkers, and the Hurst value used for fractal waypoints generation. SLAW development relies on GPS traces of human walks including 226 daily traces collected from 101 volunteers in five different outdoor sites [6]. Many traces are gathered among people those who share the common interests like students in the same university and tourists spot. SLAW expresses the regular and spontaneous trip patterns available in the daily movement of humans. People may visit same places but may at the same time, make irregular trips. The order of visiting places may be random.

The main work of this paper is to express and analyze the regularity and spontaneity by emulating a human mobility model. The study shows that SLAW identifies the unique features of various DTN routing protocols compared to random mobility techniques. Also it gives a clear performance analysis about protocols those may and may not utilize past contact history information among nodes to predict the future contact probability information.

e) Flash Flooding: Exploring the capture effect for Rapid flooding in Wireless Sensor Networks

Jiakang Lu and Kamin Whitehouse proposed flash flooding protocol for rapid network flooding in wireless sensor networks. The Flash flooding protocol allows concurrent transmissions among neighboring nodes[5]. It relied on the capture effect to ensure that each node receives the flood from at least one of its neighbors.

This flash flooding approach is divided into three parts: Flash-I illustrates complete concurrency such that the nodes repeat the message as soon as they receive it, even if their neighbors are still transmitting. Flash-II illustrates Maintained Concurrency such that nodes use MAC delay to wait for all neighbors to finish transmitting. Flash-III illustrates Controlled Concurrency which improves flooding throughput in low-duty cycle networks. This protocol approached the theoretical lower bound on flooding latency and does not compromise reliability or power consumption.

f) Gossip-Based Ad Hoc Routing

Zygmunt Haas Joseph Y. Halpern Li Li designed a gossip based approach to reduce the overhead problem. Gossip protocol acts as a communication protocol which is used to overcome the unreliable communication, data redundancy, unbounded information and overhead problem. The basic idea of the gossip protocol is that few nodes may receive the message frequently and others don't receive the message since gossip message dies out quickly during the data

network transmission. They skipped this problem by setting a gossiping probability between 0.6 and 0.8 during every execution in dense network.

Gossiping when combined with flooding technique yields good results which shows that 35% of message overhead is reduced in terms of throughput and latency [1].The probability rate is increases if it is success and decreases to 0 if it is a failure and they come to an conclusion that each intermediate node receiving the packet will gossip with the probability carried in the route request packet. Gossiping is still being useful even when global messages are sent.

III.PERFORMANCE ANALYSIS

From all the above mentioned paper the performance metrics analyzed are Latency, HOP count, Network Reachability or Network size and number of retransmissions. The analyzed metrics are consolidated in the Table.1 below:

Table 1: Performance Metrics

PROTOCOLS	PERFORMANCE METRICS			
	Latency	HOP Count	Size/Reachability	Rebroadcast
UDG	<11.4ms	22	3.5	-
SFB	.6	30	-	0.7
CBB	3ms	50	95%	<2
SLAW	0.7m	40	-	-
Flash	10.8 sec	20	-10db	6
Gossip-Based	20ms	150	30-40%	5

The above table is graphically represented as below figure 2. The figure shows different range of values for various metrics analyzed in the above survey papers.

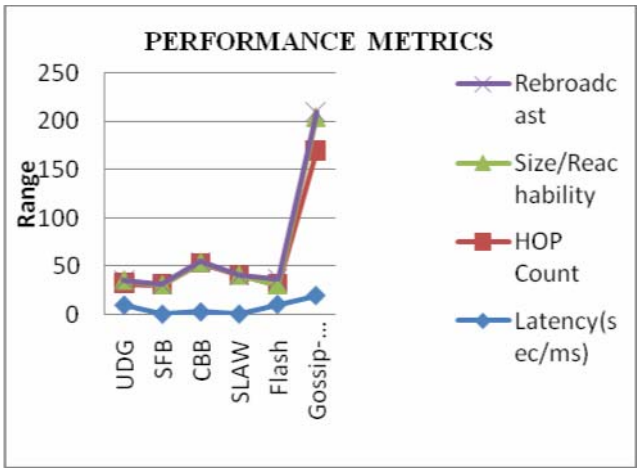

Figure 2.Analysis Graph

IV. CONCLUSION

Broadcasting is one of the primary issues in the entire wireless network and transmission of data through proper channel without any loss of data is a very difficult task. In this paper a review of broadcasting Protocol was made and their effects on the network are discussed. From all the above mentioned paper decided that it is possible to reduce the rebroadcasting, latency time of data by using any one of the protocol. It is seen that the observations are found to be good on different broadcasting schemes.

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