

High Efficient Broadcasting Protocols for Mobile ADHOC Network

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Abstract

Mobile Ad-hoc Network (MANET) is expected to be deployed in various scenarios having complex node mobility and connectivity dynamics in the future. Optimal broadcasting in mobile Ad-hoc networking is crucial for providing control and routing information for multicast and point to point communication algorithms. In this paper presents an overview on the state of the art of broadcasting techniques in mobile Ad-hoc networks, compare their performance and make recommendations to improve the efficiency performance of broadcasting techniques. In this research work we have introduced the four different types of broadcasting protocols, describe a clear concept of these protocols because we are going to work with these protocols. For this research work, we have used ns-2 simulator in Red Hat Linux environment successfully. We specially make comparison between simple flooding broadcast and probabilistic broadcast with 7 different probabilities by using two parameters which are average number of redundant broadcast and average number of single broadcast. For optimal power efficient broadcast we have analyzed the collected data and finally we have found that in probabilistic broadcast, the probability of approximately 0.275 is the best one.

1. Introduction

Wireless cellular systems have been in use since 1980s. We have seen their evolutions to first, second, third and now forth generation wireless systems. These systems work with the support of a centralized supporting structure such as an access point. The wireless users can be connected with the wireless system by the help of these access

points when they roam from one place to the other place. The adaptability of wireless systems is limited by the presence of a fixed supporting coordinate. It means that the technology can not work efficiently in that places where there is no permanent infrastructure. Easy and fast deployment of wireless networks will be expected by the future generation wireless systems. This fast network deployment is not possible with the existing structure of present wireless systems. Recent advancements such as Bluetooth introduced a fresh type of wireless systems which is frequently known as mobile Ad-hoc networks. Mobile ad- hoc networks or "short live" networks control the nonexistence of permanent infrastructure. Mobile Ad-hoc network



2. Broadcasting

“Broadcasting” is the transmission of datagram (packets) to all other nodes in the network. Broadcasting is necessary in MANET routing protocols. In telecommunication and information theory, broadcasting refers to a method of transferring a message to all recipients simultaneously. Broadcasting can be performed as a high level operation in a program.

2.1 Simple Flooding

The algorithm for Simple Flooding starts with a source node broadcasting a packet to all neighbors. Each of those neighbors in turn rebroadcast the packet exactly one time and this continues until all reachable network nodes have received the packet. propose Flooding as a scheme to achieve reliable broadcast and multicast in highly dynamic networks is an IETF Internet Draft proposing the use of Flooding as a “Simple Protocol” for broadcasting and multicasting in ad hoc networks which are characterized by low node densities and/or high mobility.

2.2 Probability Based Methods

The Probabilistic scheme from is similar to Flooding, except that nodes only rebroadcast with a predetermined probability. In dense networks multiple nodes share similar transmission coverage. Thus, randomly having some nodes not rebroadcast saves node and network resources without harming delivery effectiveness. In sparse networks, there is much less shared coverage; thus, nodes won’t receive all the

broadcast packets with the Probabilistic scheme unless the probability parameter is high. When the probability is 100%, this scheme is identical to Flooding.

3. Simulation Parameter:

Sr. No.	Parameter	Value
1	Simulator	NS-2(Version-2.35)
2	routing Protocol used	AODV
3	Protocol studied	Simple flooding, probabilistic flooding
4	Simulation time	10 sec
5	Simulation area	900*900
6	Transmission range	20m
7	Interface queue type	Drop tail/pri queue
8	Antenna model	Omni antenna
9	Channel type	Wireless channel
10	Radio-propagation Model	Two ray ground
11	Network interface type	Wireless phy
12	Maximum packet in interface queue	50
13	Number of node	36
14	Node movement model	Random way point model
15	Traffic type	CBR
16	Packet size	256
17	Bandwidth	22.0e6(22.0*1000000)
18	Starting node	15

4. Simulation Result:

AR	No. of node	36
2	No. of starting node	15
3	No. of sender	36
4	No of receiver	36
5	no. of broadcasting	196
6	no. of redundant broadcasting	196-36=160

4.1 Analysis 1

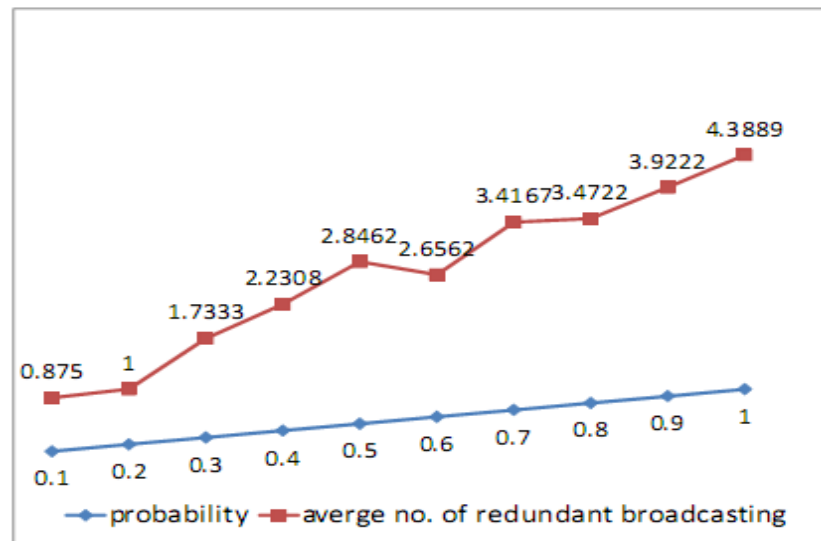
Simple Flooding starts with a source node 15 broadcasting a packet to all neighbors. Each of those neighbors in turn rebroadcast the packet exactly one time and this continues until all reachable 36 network nodes have received the packet.

5. Probability Method:

Broadcasting name	Probability	Number of source nodes	Number of destination nodes	Total nodes (from Trace file)	Number of redundant broadcasting (Total nodes-Source nodes)	Average number of redundant broadcasting (Broadcasting /Destination nodes)
Probabilistic broadcast	0.1	1	8	9	8	1.0000
Probabilistic broadcast	0.2	2	17	16	14	0.8235
Probabilistic broadcast	0.3	11	20	70	59	2.95
Probabilistic broadcast	0.4	11	29	70	59	2.03
Probabilistic broadcast	0.5	11	26	68	59	2.2692
Probabilistic Broadcast	0.6	19	33	110	91	2.7575
Probabilistic broadcast	0.7	30	36	170	140	3.8888
Probabilistic broadcast	0.8	29	36	142	113	3.1388
Probabilistic broadcast	0.9	32	36	166	134	3.7222
Simple Flooding	1.0	36	36	196	160	4.4444

5.2 Analysis 2 on probability vs. average number of broadcasting:

From the calculation, we have seen that increasing probability increases the redundancy in broadcasting message. Besides, it also increases number of source nodes, number of destination nodes, total nodes (including redundant broadcasts) and number of broadcasting along with it. By analyze, we plot the graph given below , where only the values of probabilities and average number of broadcasting are considered.



6. Conclusions

The MANET is faced with the problem of energy efficiency in order to maximize the network lifetime. The goal of this research work is to explore energy efficient protocols in broadcasting scenarios. From the analysis and discussion we can say that the probabilistic broadcast is better than simple flooding. Because

- It saves energy to increase network lifetime.
- It makes less channel congestion by nodes and thus uses channel bandwidth efficiently.
- It decreases the broadcast of redundant messages and thus increases system performance.

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