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Improving Data Distribution in Delay Tolerant Mobile Network

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Abstract: ***This work center on data dissemination in mobile ad-hoc network. The main operation involved in such networks is the data sharing. The day-to-day increasing demand of wireless communication creates various problems such as lack of bandwidth, network failure, increase in number of overheads, etc. The proposed scheme delivers data messages from sources to node with corresponding interests i.e. source to destination data transmission is not required and last hop communication takes place which in turn reduces the number of overheads. Thus nodes never become selfish and co-operate for data dissemination. Such scheme is called as Multi-Receiver Incentive based collaboration improvement technique. This scheme focuses on multicast scenarios where the incentive will be granted to all the nodes occurring in the path from source to destination in order to improve the cooperation among the nodes in the MANET. Also security of the data will be maintained by encrypting the packets before disseminating. The proposed technique will improve data dissemination capability of the network. The work completed till now is network formation, node discovery, receipt allocation to account centre and data transmission from source to destination.***

Keywords: Dissemination, mobile ad-hoc network, selfish and co-operate node, Multi-Receiver Incentive technique, encryption, mechanism.

1. Introduction

Wireless equipment has become basic need of day-to-day life. The exponential increase in wireless equipment, demand for rapid development in wireless technology. Both subscriber and user want error free communication with negligible delay. To reduce number of hops we want some mechanism which will co-operate for communication and reduce delay.

In delay tolerant network we required store and forward feature for the data transmitting as well as receiving. But due to restriction of resources mobile wireless node may not be willing to further transmit data to other device. Such type of node is called as Selfish node. Hence smooth data sharing may not possible because of such selfish node. Resources needed by such access are very high taking in to consideration the structure of mobile devices, thus constantly using data service is very costly. Hence less costly mechanisms with better quality are needed to be designed.

The selfish nodes can be motivated to store and forward the data packets to next hop or destination so that the data dissemination can be effectively improved with improved quality and packet delivery ratios. For such better data sharing and uninterrupted communication a Multi-Receiver Incentive Based collaboration improvement techniquewith data security in MANET is proposed.

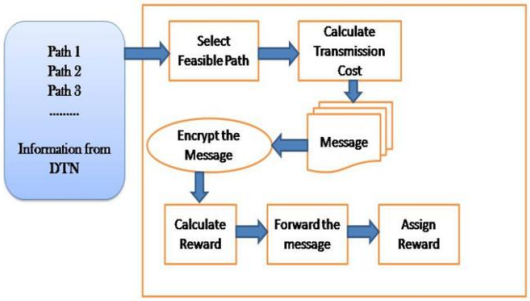

Figure 1: Overview of Proposed scheme

This scheme proposes data dissemination by utilizing fewer numbers of hops. Incentive mechanisms are based on which all the nodes in MANET agree upon that ensures better dissemination of data packets. The incentive mechanism will be designed in such a way that the chosen delivery path will consist of less number of hops.

The security of the data packets to be disseminated in the network is also improved in this mechanism by using Symmetric Key Encryption methods. This scheme will aim to improve delivery ratio, transmission efficiency and data security.

2. Problem Definition

Previously the Incentive allocation schemes proposed based mainly on granting the incentive to only last node occurring in the path of communication. The total result of these schemes was that the remaining nodes in the path were unwilling to perform the store and forward duty which they were supposed to perform i.e. the nodes becomes co-operative. Also the security of the data packets in such Incentive mechanisms is taken into consideration in order to improve it.

3. Literature Review

The incentive mechanism is attractive region of research. There are various existing method on incentive mechanism like; [1], propose a incentive mechanism in which incentive is provide only to last node, [2], design a mechanism in which the incentive is proportional to its contribution to the total drop in peak time demand. [3], contributes 1) provide security to data packet by searchable encryption mechanism, 2) the weak subscription strengthen confidentiality by using multi-credential routing technique , and 3) perform investigation of various attacks on subscription confidentiality. These three schemes provide less key management and the cost for encryption, decryption, and

routing is. [6], the problem of peer-to-peer networking for data dissemination among actors in wireless Sensor and actor networks (WSANs) solve by using Energy-Efficient Message Dissemination protocol (EMD). [4], define the Selfish replica Allocation which show three types of behavioral states for nodes, 1) non-selfish nodes. 2) Fully selfish nodes. 3) Partially selfish nodes. [7], proposed a scheme that contribute in two-phase. First, design and evaluate a novel social-based forwarding algorithm known as BUBBLE that utilizes the aforementioned metrics to improve delivery performance. Second, comparison analysis which show that BUBBLE can substantially improve forwarding performance as compared to number of previously proposed algorithms. [8], explore a cooperative user centric information dissemination scheme which allows published data items to be delivered to interested nodes efficiently. This scheme uses fewer relays and allows each node to operate distributed.

4. Objectives of Proposed System

The propose system design in such a way that it removes drawback of existing system. The proposed system becomes efficient by achieving the following objectives:

4.1 Transforming of Non-Cooperative Nodes into Co-Operative Nodes

For better information sharing in delay tolerant mobile networks all nodes must be cooperative node and no selfish node present. But due to limitation of resources such as battery power, communication bandwidth, the devices in MANET tend to behave in selfish manner in order to preserve these resources. Therefore in practice we need incentive mechanism to encourage users to cooperate for effective data sharing.

4.2 Improve Data Transmission in MANET

In the incentive mechanism packet dissemination in MANET is improved by selecting the shortest possible path. It encourages nodes to cooperate and wisely selects paths that can reach multiple subscribers efficiently. Hence data dissemination improved.

4.3 Providing Security to the Data Transmission in MANET

The nodes from source to destination which are storing and forwarding the data packets may try to alter the data for its own favour and may forward the altered data packets to next hop in the path. Our Multi-Receiver Incentive Based collaboration improvement technique scheme performs encryption on all the data packets which are to be disseminated from the sender in order to insure the security of the data.

5. Research Methodology

5.1 Proposed Incentive Mechanism

In the technique the reward of transmitting packet will be calculated. The system will verify whether the source of the packets is capable to manage to pay for the calculated cost. After this confirmation the system will calculate the reward to be approved to each node in the path. The selected cost will then be awarded to each of the nodes as a incentive after the node has forwarded the data packet to next node in the path.

5.2 Network Model

Each node in the network is viewed as a user with a mobile device which is capable of communicating in a wireless interface.

Authentication procedure is carried out as soon as the node announces itself to the network which makes him a legitimate node to take part in the communication. To induce cooperation among the nodes of the network, the nodes are provided with a certain amount of virtual “reward” that can be viewed as function of the number of hops it may take to deliver a data item to that node.

Each node can act as a publisher, a subscriber or both. Every publisher can publish data items that belong to different channels. Subscribers can receive the data opted by him.

5.3 Data Collection

When a publisher and subscribers communicate, the information related to the paths encountered for the communication are collected by all the other nodes. This information may provide as a means of formulating the historical paths when next time the communication occurs. Also the same phenomenon is applied when any two nodes in the network communicate with each other. Also if at any point of time the information related to paths is updated, the same will be done in order to find out the most feasible path.

5.4 Encryption mechanism

A Symmetric Key Encryption algorithm is used to encrypt the data packets which will be transmitted in the network from sender to receiver. The encryption mechanism helps in improving the security of the data packets by making them unreadable for nodes which are non-authenticated.

6. Proposed System

6.1 Flow of the Proposed System

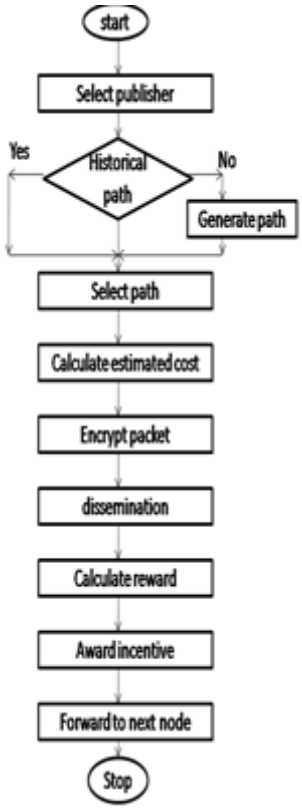

Figure 2: Flow of the Proposed System

If historical path is present then select most optimal path among them or generate new path.

- Calculate the estimated cost required for the overall system.
- Encrypt data by applying encryption mechanism.
- Broadcasting data to various nodes.
- Calculate reward for each particular node contributed in dissemination.
- Award incentive to all nodes.
- Data will reach to its destination with minimum hop distance and minimum delay.

6.2 Network formation

The network formation in a simulated environment using NS2 is carried out by allowing each node to broadcast a Topology Discovery packet to all the nodes. By broadcasting this packet each node announces itself to the network that it is available for communication i.e. to be able store and forward the packets. The simulation shown in Fig. 3 indicates 33 nodes to be a part of actual communication network. Two additional nodes are used for implementing the incentive mechanism. One node is taken as a Accounting Center (AC) which keeps track to awarding incentives to the nodes. A Base Station (BS) node is considered which acts as a intermediate node between the nodes in the network and Accounting Center.

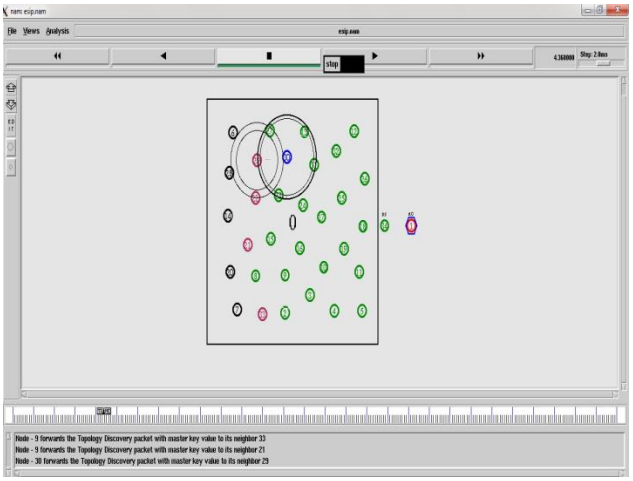

Figure 3: Network Formation

6.3 Receipt submission

In Fig. 4 the Receipt submission phase includes each node announcing itself to the accounting center AC about its eligibility in receiving the receipt. Each node submits a receipt packet to AC for this purpose. The Accounting Center considers only those nodes for granting the incentive who have submitted receipt.

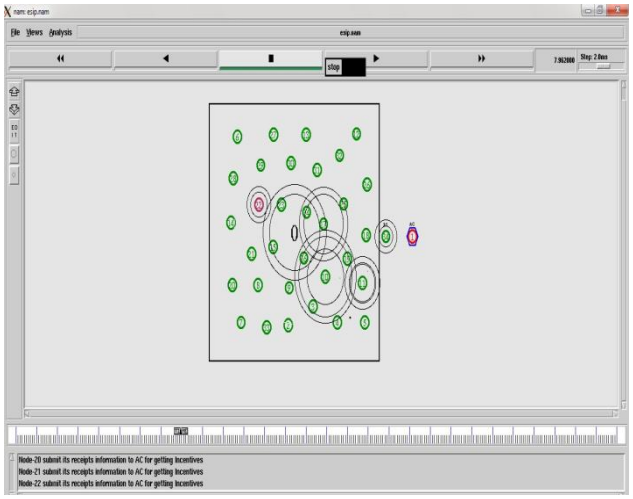

Figure 4: Receipt Submission

6.4 Data Dissemination

In Fig. 5 data dissemination source node transmit data to destination node. As shown in figure, source node 3 transmits data packets to destination node 9 along with symmetric key value.

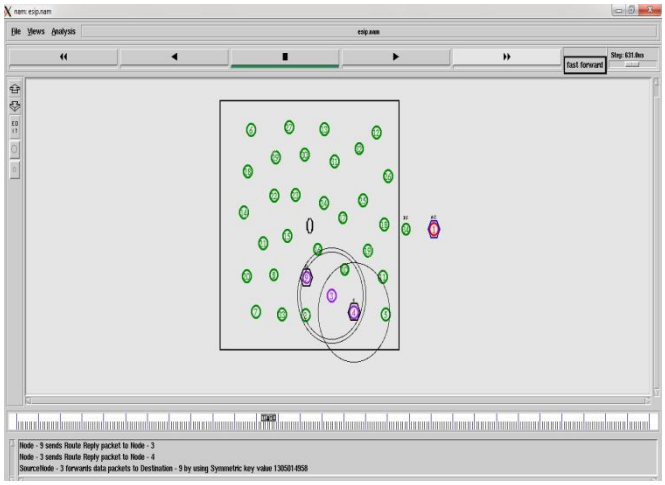

Figure 5: Data Dissemination

7. Conclusion

The task of forming a network with symmetric key generation to be used for encrypting the packet has been completed. Further, sending of encrypted packets and granting incentives to all the nodes is completed. Hence the data dissemination in a Delay tolerant mobile ad-hoc network get improved.

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