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INCENTIVE DRIVEN INFORMATION SHARING IN DELAY TOLERANT MOBILE NETWORKS

Ms. Madhavi Gholap
Department of Electronics & and Telecommunication, VVPIET Solapur, Maharashtra India

Ms. Preeti Kadam
Department of Electronics & and Telecommunication, VVPIET Solapur, Maharashtra India

Assoc. Prof. Sajid Shaikh
Department of Electronics & and Telecommunication, VVPIET Solapur, Maharashtra India

ABSTRACT

Now a days, with the rapid advancement of wireless technologies, mobile wireless devices such as smart phone's, PDAs, and Notebooks are available and they are playing very important roles in our daily life. Such gadgets permit individuals to get to data any place at whatever time subsequent to these gadgets have increasingly larger storage and support multiple network interfaces including cellular, WLAN, and Bluetooth. Thus, besides using such devices to make phone calls and send text messages, clients can use these gadgets to get to and store intriguing information things, for example, news clips, sports events, finance forecast, and trending tweets. Generally, peoples are using such devices for making bank transactions, keep in touch with friends, family members, relatives etc. Clients can likewise store such data and offer with each other by means of deft peer to peer links. (for instance Bluetooth ,WiFi).In this survey paper first I have described our proposed schemes i.e , Multi-Receiver Incentive-Based Dissemination (MuRIS) in brief, also I have described various previous implemented approach with their pros and cons. I have described in brief MobiCent, Incentive-Aware Data Dissemination in DTN, MOPS, SMART, Pi protocol with their brief introduction and their advantages and limitation. I have also described the comparison of previous approach.

KEYWORDS*: *Delay Tolerant Networks (DTN), Multi-Receiver Incentive-Based Dissemination (MuRIS), Incentive mechanism, publisher/subscriber, delay tolerant networks, data sharing, mobile networks

INTRODUCTION

With the rapid advancement of wireless technologies, mobile wireless devices, e.g., smart phones, PDAs, and laptops have emerged and they are playing very important role in our social life. Mobile devices allows people to access information 24X7, since these devices have increasingly larger storage and support multiple network interfaces including cellular network,

WLAN, and Bluetooth. Thus, besides using such devices to make phone calls and send and receive text messages, users can also use these devices to access and store interesting data items such as news clips, video clips, sports events, Audio and video song, photos and picture etc.

Cellular data services are available everywhere, the cost associated with the usage of such services to access information is very high because the energy consumed with such constant access is high. On the other hand, it is attractive to use peer to peer ad hoc networks which is formed by these wireless devices that generally utilizing lower-power radios (e.g., , Bluetooth or Wi- Fi) to share helpful data among clients. All these stored data items can be organized into various categories, e.g., entertainment, finance, politics, technology, softwares etc. Users can acquire the data items from their peers by simply expressing their interests based on data categories which are used to describe these data items.

In order to enable smooth information sharing in delay tolerant mobile networks, the participants need to be cooperative. However, all such peer to peer ad hoc networks are typically human-contact based networks, and here users are selfish and they are not ready to consume their resources for the other users.

People always wish to preserve their devices' resources such as communication bandwidth and battery power. In practice, for content dissemination scheme, we required to incorporate an incentive or reputation mechanism to encourage users to cooperate for effective information sharing.

A recently proposed incentive-aware data dissemination scheme seems to be more promising for multi-receiver scenarios. The incentive mechanism in this work focused on rewarding the last-hop relay node which communicates with the destinations, which is not fair for all other relay nodes. The performance of this incentive mechanism decreases when data items are sparsely distributed among nodes due to its restrictive replication mechanism .

However, peer to peer links are opportunistic links which are intermittent in nature and hence it required to store-and-forward feature in Delay Tolerant Networks that provides facility of sharing the data . On the other hand, due to the limited resources, such as communication bandwidth and battery consumption mobile devices can be selfish and may not be willing to forward data items to other devices that are interested in such items. Therefore, I need to design effective data dissemination schemes which encourage nodes to share data with the other nodes.

In this work, I am going to design a Multi-Receiver Incentive-Based Dissemination (MuRIS) scheme .MuRIS encourages nodes to cooperate via our proposed incentive mechanism, it also selects paths that can reach to the multiple Subscribers very efficiently. Here, in this proposed work charge and rewarding functions can prevent edge insertion attacks. Edge insertion attacks is the easiest approach for relay nodes to obtain extra incentives without doing any obvious misbehaviours. Such attacks can significantly impact the fairness of the network since subscribers need to pay more total rewards. In addition, other honest relay nodes on the same delivery path receive fewer rewards than the relay node launching the edge insertion attack. Here, charge and rewarding functions provide no rewarding gain for malicious nodes, which insert fake intermediate nodes during their edge insertion attacks. This proposed information sharing scheme allows nodes to utilize locally maintained information about past node encounters and partial delivery paths to determine if they should forward received data items to other node or not.

SYSTEM ARCHITECTURE

A. NETWORK MODEL

The node in the network model of MuRIS represents a user who carries a mobile device which consist of wireless interfaces including cellular, WLAN, and Bluetooth. Here, I am considering the nodes with same transmission and reception ranges. The transfer speed of every hub is sufficiently vast to prepare the information trades when two nodes encounter. Also, I have consider that the message delivery paths from a source node to destinations node may repeat frequently. Every node in this network are assumed to be authenticated first when they join the network. Every node is interested in receiving data items belonging to some categories. To encourage cooperative dissemination, a node is willing to be charged a certain amount of virtual money . It is the function of the number of hops it takes to deliver a data item to that particular node. Every node in a delivery path shares the same reward. The reward is inversely proportional to the total hop count in the delivery path such that nodes are encouraged to choose paths with fewer transmissions. Here, in this work I am going to consider that, every node is selfish, which means it will not help to relay data unless it can gain some benefits. I assume that there is a central transaction server offering secured service, which guarantees each node can collect their rewards weekly basis or monthly basis.

B. DATA MODEL

Data items in our network may be organized into different categories. For example, news from IBN7 may be classified into the following categories: governmental issues, climate, stimulations, and so on. All news identified with legislative issues can be further portrayed utilizing different sub-categories, for example, healthcare and debt crisis. C. Distributor /Subscriber (User) In our work, every hub can be a distributor, a supporter or both. Every distributor can distribute information things that fit in with diverse channels healthcare and debt crisis.

C. PUBLISHER/SUBSCRIBER (USER)

In our work, each node can be a publisher, a subscriber or both. Each publisher can publish data items that belong to different channels. Further, each subscriber has an interest list indicating the channels that the subscriber is interested in.

D. MESSAGES

There are three types of messages in this proposed system:

PROBE MESSAGES: Probe messages are used to record possible paths from publishers to subscribers. The probe message send during warm up period or when nodes are idle for a while.
RECEIPT MESSAGES: Receipt messages are only generated by subscribers to confirm the path information carried within a newly received probe message.
DATA ITEM MESSAGES: Data item messages are generated by publishers to distribute data contents in the network.

LITERATURE SURVEY

A. MOBICENT :

A Credit-Based Incentive System For Disruption Tolerant Networks MobiCent [2] uses routing protocol which discovers the most efficient paths for message delivery. When node has in-transit bundles, it will not create non-existing contacts which can increase their rewards. Ultimately, nodes are purposely not wasting their chance of bundle forwarding. MobiCent operates on top of an underlying DTN routing mechanism, and it does not rely on any specific routing protocol. Packets are forwarded based on their priority which is given by the node. The amount of data that can be transferred in a single contact is dependent on the duration of the opportunistic contact.

MobiCent works by setting the client's payment and the relays' rewards so that nodes will behave truthfully. In this way, hubs will constantly forward bundles without including apparition joins, and never squander contact opportunity unless the reward is inadequate. As a result, the (best) forwarding paths that should be discovered by the given routing protocol through replication and forwarding will be discovered.

ADVANTAGES AND LIMITATION:

1.Resisting edge insertion assault and edge covering up assault.

LIMITATION:

Require trusted outsider.

B. INCENTIVE-AWARE DATA DISSEMINATION IN DELAY-TOLERANT MOBILE NETWORKS

I. introduction- In this work [3], creator have displayed successful plans to assess the normal credit remunerate, and define nodal correspondence as a two-man helpful diversion, whose arrangement is found by utilizing the Nash Theorem. Broad recreations are done in light of true follows to assess the proposed plan regarding information conveyance rate, postponement and overhead.

SYSTEM ARCHITECTURE:

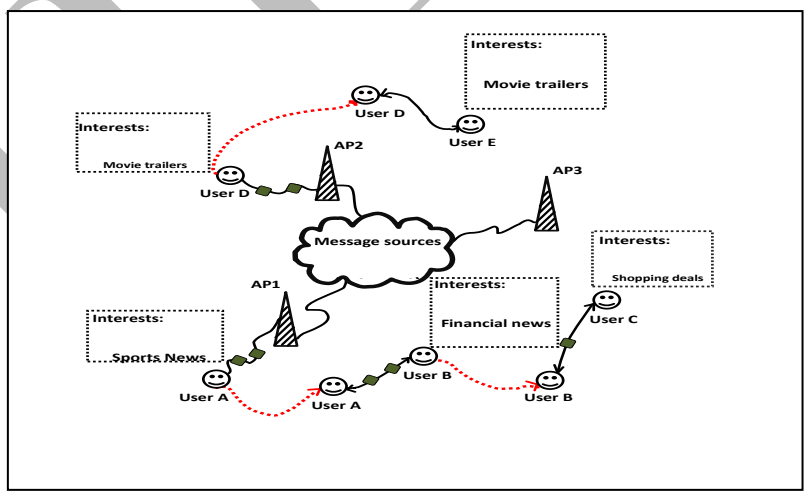

Figure 1: An Example of Data Dissemination.

Above figure 1 describes the working of data dissemination with an example. where mobile User A is equipped with a smart phone and he is interested in sport news and part-time job advertisement. Surely , he will download such information via cellular channels, which is however costly. He can download data of sport news and part-time job advertisement to not only satisfy himself but also he will share them via Bluetooth or Wi- Fi to other mobile users (example Client B) who don't have routine access to such free APs. Along these lines, information can be spread without indicating the beneficiaries however just by declaring the type of the message content Directing is no more to discover a conclusion to-end way. Instead, the network delivers data to the interested users based on the types of messages. Note that, a mobile user can intentionally download data that are not of his intrigues yet fancied by different clients to advance enhance the proficiency of the whole network.

Be that as it may, the members in such a system can be either agreeable or narrow minded If all nodes are cooperative, each node carries messages for other node voluntarily. On the other hand, when a node is selfish, it may consume its energy, buffer and bandwidth resources for other nodes, and thus this selfish node may refuse to carry any messages other than the ones interested by itself. If I consider the worst case situation where each and every node is selfish then data are not shared at all among mobile nodes and due to this can lead to poor network performance.

ADVANTAGES AND LIMITATION:

1.This proposed Incentive scheme, estimate the value of messages effectively fosters cooperation among nodes and use of communication resource very effectively , so that I can get higher delivery rate.

2. This proposed Incentive scheme achieves very low overhead, since a node receives only a message copy if it is confirmed that this received copy can benefit it.

3.This proposed Incentive scheme stimulates the cooperation among nodes and allows a node to strike the balance between its individual interests and contribution to the network.

4. There is less impact on the performance of the proposed Incentive scheme, even if I increase the queue size. It exchanges messages based on interests of individual nodes, aiming to promote rewards. Thus the nodes do not utilize the additional space.

C. MOPS:

Providing Content-based Service in Disruption-tolerant Networks

INTRODUCTION:

In this work [4] , author have used the publish/subscribe scheme. This is an asynchronous messaging approach , to provide the content-based service. The subscribers, which are the information consumers, which express their interest in certain events without knowledge of what publishers there may be.

The publishers, which are the information producers, producer always issue newly detected events without having to specify the receiver. The brokers, which match events with interests, which is deployed as the interface between the publisher and subscriber.

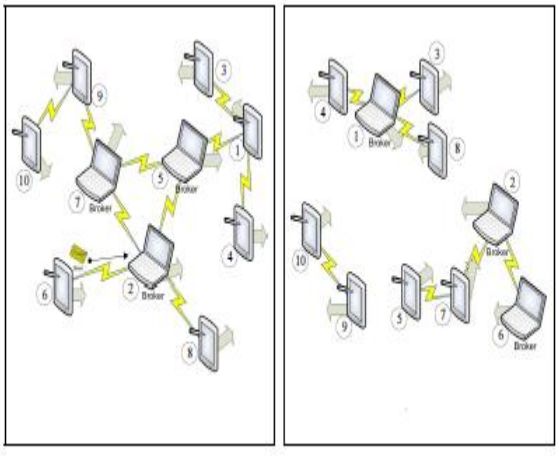

Figure 2 : Example of Publishers and Subscribers

Above Figure 2 shows a n example of publishers and subscribers service where students can share campus news videos, some of tutorial, lecture information over the network composed by their mobile devices . In Fig. 2 nodes labelled broker can be publishers or subscribers, and other nodes are publishers and subscribers.

ADVANTAGES AND LIMITATION:

1.Publishers Subscribers schemes provide a high degree of flexibility and adaptability to change by decoupling the source and destination, which can provide the facility of information dissemination in the DTN.

2.With the increasing popularity of mobile handheld devices, which have ad hoc wireless communication abilities , the DTN become more and more attractive.

LIMITATION:

1.The brokers which are used in these scheme are deployed according to connectivity metrics and the topology . Sometime this parameters are required to maintained dynamically . In any case, when the systems are very rapid, support expenses will be higher than adequate, consequently thus rendering these schemes inapplicable to the DTN.

D.SMART:

A Secure Multilayer Credit-Based Incentive Scheme for Delay-Tolerant Networks

In this work[5], author have implemented a secure multilayer credit-based incentive (SMART) scheme for DTNs with selfish nodes. Like the other previous credit-based incentive schemes, SMART also uses credits to provide incentives to selfish nodes. One of the unique and distinguished feature of the SMART is that it permits the credit to be exchanged/disseminated by the present moderate hub without the involvement of the sender. There are two main challenges in designing of SMART:

1. To guarantee that the security properties of the plan are not bargained. Since all security related to a coin, basically during the store-carry-and-forward process, is managed by the intermediate nodes, a selfish node may attempt to cheat the system in order to maximize its expected rewards

or credits. As an example, a selfish node may arbitrarily add a fake layer into the present coin or expel a few substantial layers from it, if such activities can augment its welfare.
2. Any security functionality may incur extra computation and transmission overhead.

ADVANTAGES AND LIMITATION:

1.Scalability of SMART is very high

LIMITATION:

1.While Installation and designing SMART requires trusted third party
2. Communication overhead in digital signature process.

E. PI: A PRACTICAL INCENTIVE PROTOCOL FOR DELAY TOLERANT NETWORKS

In this work [6] , author have implemented Practical incentive (Pi) approach in order to improve the performance of the DTNs in terms of high delivery ratio and low average delay. It also address the selfishness problem in DTNs.

In this protocol , when the source DTN node sends a bundle of packets , it doesn't set a routing path in advance, only I need to attach some incentive on the bundle. Then, the selfish DTN nodes on the road could be stimulated to help with sending the group to enhance the conveyance proportion and lessen the normal deferral of the entire DTNs. whole DTNs.

ADVANTAGES AND LIMITATION:

1.By adopting the proper incentive policy, the proposed Pi protocol improve the performance of DTN network in terms of high delivery ratio and low average delay.
2. The Pi protocol also achieve the fairness among DTN nodes.
3.The Pi protocol can resist most attacks launched by selfish DTN nodes.

LIMITATION:

1.Require trusted third party.
2. No multi-copy data forwarding mechanism is supported.

I. COMPARISON OF CREDIT BASED APPROACH

Approach	Basic Idea	Pros	Cons
IPAD : An Incentive & Privacy-Aware Data Dissemination Scheme in Opportunistic Networks[7]	Incentive strategy which is fair as well as with protection of mobile nodes privacy for efficiently disseminating a time-valuable data	It provide mobile nodes: 1. character protection 2. area security & 3. Social profile privacy	It Require trusted third party
TIS : [8]	Use of modified population dynamics model as the	Resisting the layer adding	It Require trusted third party

	basis of Incentive scheme		
Coupons : A multilevel incentive scheme for information dissemination in mobile networks[9]	Incentive is contextual and is based on an ordered list of unique IDs appended to messages	Scalability is very high	Charging rate is application dependant
IAR: Incentive-aware routing in DTNs[10]	It uses DTN routing to optimize the route when all nodes are co-operative. And selfish DTN routing when selfish nodes are present	Does not require trusted third party	Reciprocates good or bad behavior only between neighbors

CONCLUSION

In this work, I am going to develop a Multi-Receiver Incentive-Based Dissemination scheme which allows nodes to cooperatively deliver information of interest to one another via chosen delivery paths that utilize few transmissions.

MuRIS that not only encourages nodes to cooperate but chooses delivery paths that can reach as many subscribers as possible with fewest transmissions. The wise choice of delivery paths is achieved via our proposed multi-receiver based incentive mechanism. The Multi-Receiver Incentive-Based Dissemination scheme (MuRIS), utilizes local historical path and tracks users' interests information maintained by each and every node. In addition, the charge and reward functions implemented within our MuRIS scheme plan animate collaboration among hubs such that the hubs have no motivating force to dispatch edge insertion attacks. Furthermore, the charge and reward functions are designed in such way that the chosen delivery paths mimic efficient multicast tree that results in fewest delivery hops.

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