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Improving the Performance Using Shared Spread Protocol in Issue Guarantee Protocol over Delay Tolerant Networks

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Abstract
The dissemination of information to users most likely depends upon issue guarantee method where the network disseminates distributed information only to those users who are highly interested to receive. Due to this advantage, these services are used only in dynamic environments among the parties taking part in transmitting information. The users with shared interests tend to co-ordinate and utilize the services. Due to this, the performance is greatly improved and overcomes the problems due to displacements caused by the users and frequent disconnections. This paper makes use of shared spread routing protocol for the issue guarantee model. Here the best medium for information transmission is chosen for which its performance and operations are analyzed and validated. Evaluation is conducted based on the surrounding node and user displacements, greater dissemination with lower traffic and fewer amounts of copies of information within the system.

Keywords: Dissemination, Dynamic Environment, Displacements, Shared spread, Issue guarantee, Disconnections.

Introduction

With the advent in recent technologies, it is possible to foster communication between individuals scattered over the globe not only through traditional means but also by effectively utilizing communication networks e. g. e-mails. It is possible for the receiver at the destination to determine the flow of information over the network by making use of pervasive and ubiquitous computing environments. For instance, it is possible to publish a service freely without any prior knowledge about the developer of the application for the purpose of the user by combining it with the service based on the narration. It is possible to deliver news or an advertisement without mentioning the destination just by stating the content that makes up that the message. An active solution was provided by issue assurance model. In this model, there exists no correlation between the creator and user of the information. The creator of the information simply passes the information into the network. This totally eradicates the need for routing protocols since they are not subscribed for use inside the message. Delivery of information is achieved by finding the user of interest by analyzing the content of the message. This method is completely suited for static situations because the communication between the users happens over time which also changes and can detach from one another during the creation of message [1]. Here, delay tolerant system deals with the issues raised by issue assurance model. It is hard to analyze a social issue [2] [3] since the information are most likely created and used by the users which on dynamic situations displays their social activities. These denote occasionally connected networks where the connections are guaranteed accurately by depending on the social attachments of the users. The long range users of same group may migrate far behind and can experience longer disconnection periods but will surely mingle up with each other. The authors discuss about shared spread routing protocol which supports issue guarantee method between occasionally linked users. Much simply a balance on information regarding the interests of the user at destination along with routing and social connections of the users mainly with their dynamic locations can be guessed.

System Representation

The system is represented using a network of 'ni' nodes with an assumption that they can hold their messages into a buffer of size φ. The nodes are dynamic in nature and are connected to one another via wireless links. The dynamic nature of a node depends upon the movement of the user. Due to this facility, a node can act as issuer or user of that information without knowing each other. The user identifies the issuer based on their interests which make it possible to utilize the information after its dissemination. The ultimate focus of the protocol is to convey the message to the interested nodes by considering its correlation with the interest. More precisely, the dissemination of message is based on the information achieved by correlating the interest to the theme of the message thus allowing for more complicated and direct correlation with the message. The ultimate focus is that the users possessing common interests couple among themselves than with other users [8].

The nodes are dynamic in nature and move from one place to another place with different speeds to the desired directions thus causing frequent separations over the network. The communication between the nodes happens among themselves using 1 – hop neighborhood information by spreading the information to all other nodes surrounding them or to a particular node.

Shared Spread Routing Protocol

The characteristics of the routing protocols are mainly described under this section. This protocol enables choosing of medium for transporting the information in a store and forward fashion. For a node 'ni' based on its interest, its correlation with the message is identified over the medium 'nm'. The protocol depends on the dynamic nature and its position, correlation along with other nodes. The routing technique happens in three phases: delivering interests, choosing the medium and finally conveying the information. Here, each and every phase practically gets evacuated one after the other over a period of time without the need to concatenating one another.

A. Phase 1: Delivering Interests

During this phase, a command message is transmitted to all the nodes with interests where the surrounding nodes are 1 – hop neighbor nodes. Initially the interests are computed by using information present within the current node before delivery. This information is stored into routing table of the surrounding nodes which are 1 – hop neighbors which is the sole authority to make decisions regarding message forwarding.

B. Phase 2: Choosing the Medium

In this phase, the service provided by the local node is analyzed again for all interests. Then these services are compared for each and every interest with the node that highly communicates with the surrounding nodes. Consider 'Sn' be the service provided by the node 'in' defines the interest of every node then the node which highly communicates with surrounding nodes can be easily calculated as,

$$S_{n,\,i} > S_n + \sigma$$

This clearly explains that for every interest 'i_n' 'n_i' acts as a better medium than the local node. Σ is the maximum limit which retards the information to travel back and forth between the communicating parties those having similar deviations in providing services.

C. Phase 3: Conveying the Information

During this phase the information present inside the temporary storage is re – assessed for new services and are conveyed to the nodes with interest or to the better medium. A replica of information which best matches with the interest is transmitted to all of the surrounding nodes which also hold the interest. Care must be taken that all the interested nodes properly receives the information but does not mean that they act as medium to convey the information. More precisely this role is performed as a result of predecessor phase. In case if the local node still acts as medium there is no need to proceed with new action else all the information with interest to that particular node are removed from that node of interest and send to 'ni' which are again placed into temporary storage. There can occur a problem in case if 'ni' also becomes user of the particular interest during which the information that were matched are marked to instruct the medium that these information are to be inserted into the temporary storage rather disseminating them to the users.

The information is intended to be forwarded to those users in case they have not received it properly. The verification is achieved by validating the list of information acknowledged during the delivery of information. To end with distributing the information simply by distributing it into the local storage where the information is forwarded to the users who are interested and ready to act as a better medium. The shared spread tends to cope up on whatever the information present inside the temporary storage regardless of the information present into it. For guarantying the dissemination of information a distribution mechanism is needed which place replicas of the information. Here each replica is forwarded independently to make sure that these replicas multiply within the system. These replicas are made by the issuer of the information and that to during the distribution.

Mobility Prediction

Initially the service selects the medium for communicating the information. For which the dynamic nature of the node is to be analyzed which determines the possibility for a node as a medium for the users that holds interests towards that node. The service depends on the following aspects as displacement of a node over time, battery power, co-operation of surrounding nodes, etc. The first step depends on finding the surrounding node which also has the same interest as the present node. If a match is found the message is disseminated directly. This analysis is predicted based on the probability of the users location but the users can consider many aspects for disseminating the information. It is also possible that another surrounding node can also show interest towards the service during which the level of connectivity changes.

It is essential to hold all the information about the present state since it can be helpful for making decisions in the near future. It is not required to hold all the past history about the system. The focus is made upon the nodes that are close to one another since the users can access the service which is not in a random fashion since they are socially connected so they get connect to each and every users who have access to the devices.

The presence of nodes around a service of shared interest can be explained as,

$$S_{loc,i}(t) = \begin{cases} 1 \text{ if service is shared with a user for a particular interest} \\ 0 \text{ otherwise} \end{cases}$$

The displacement of nodes can cause the node to change its connectivity with that particular service.

Performance Analysis

The analysis is performed mainly by focusing on message dissemination and traffic in the network. The effectiveness is studied as the percentage of messages disseminated to the interested users. The traffic patterns can be predicted based on the number of messages forwarded. Figure 1a depicts the number of copies inside the system which in turn has great influence towards the traffic inside the network. Using the shared spread routing protocol it is possible to achieve greater information dissemination with less copies of information inside the system. Minimal copies can improve the performance of the system thus not allowing the traffic to increase because huge copies will increase the traffic within the system. For which the protocol acts a medium thus allow to reach more users thus obtaining good performance with less number of traffic. Figure 1b depicts the life time of the information which determines the life time for information which thereby increase in case if the message tends to revolve around for much large duration time. It is essential to minimize the life time of message since it is made use only on demand. For random information it requires larger time to reach the users for which our protocol identifies the best medium to deliver the information thus by controlling continuous forwarding of messages. Figure 1c depicts the size of temporary storage since it plays a major role. Since the devices are compact enough to hold in hand it is necessary to manage the memory for the devices. Our protocol chooses best medium for information transmission so the messages will be stored among the surrounding nodes thus managing the memory spaces effectively. Figure 1d depicts the rate at which the node is travelling for which faster medium are likely to be preferred since they can reduce the time in disseminating the information. The study for capacity to adjust for the network conditions thus retarding the necessary to generate traffic when not needed is achieved. It is been made clear that our protocol retards unnecessary forwarding of messages.

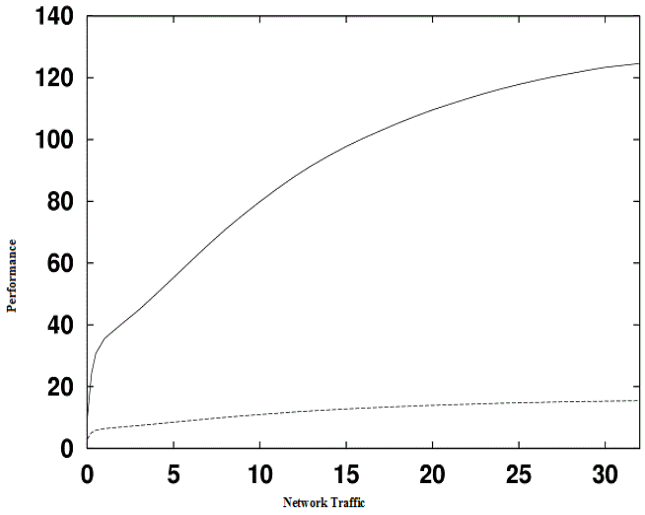

Fig. 1a: Number of copies inside the system

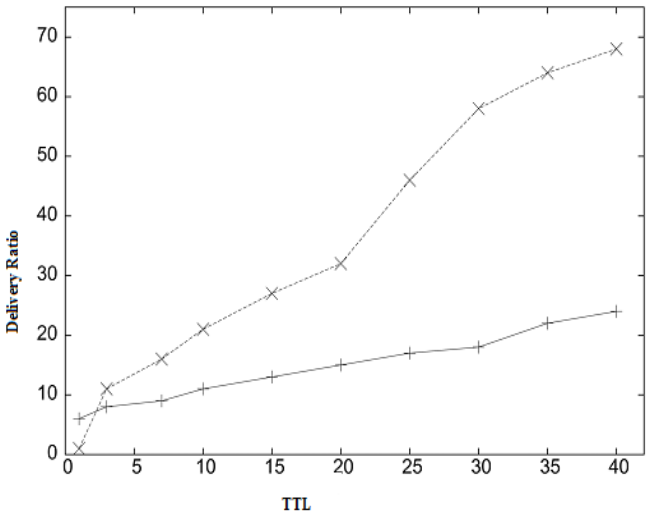

Fig. 1b: Life Time of Information

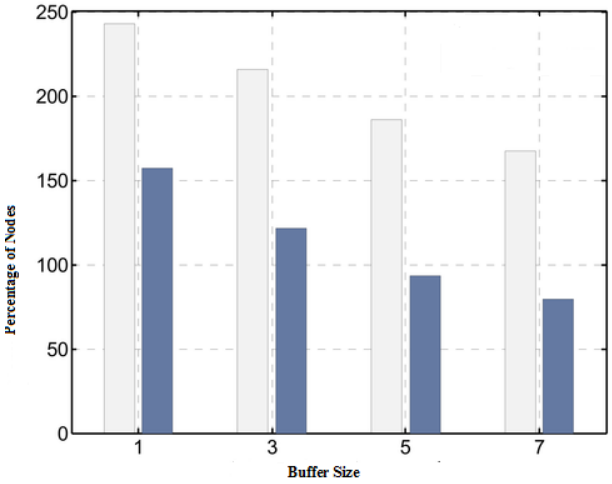

Fig. 1c: Size of Temporary Storage

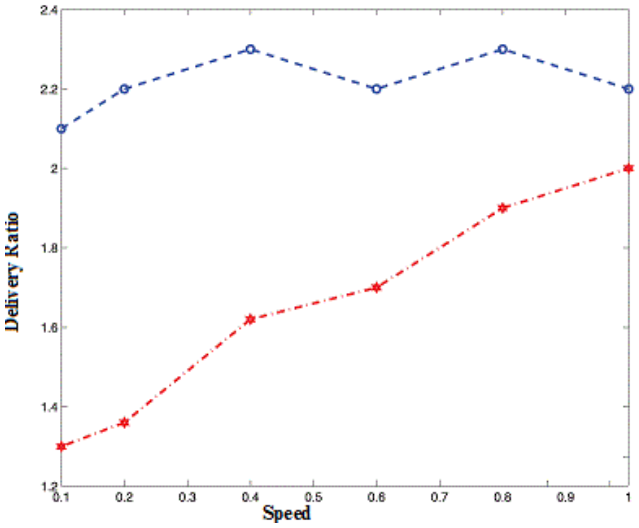

Fig. 1d: Rate of Node Displacement

Conclusion

The ultimate focus of paper is on shared spread routing protocol which supports delay tolerant networks. The technique combines the users which remains close together thus making effective usage of information dissemination from issuer to the interested users. The scheme makes use of displacement of the users and its surrounding nodes for analyzing the frequency in path changes and the merits of store and forward technique for disseminating the message, calculating delays. It is possible to evaluate the protocol with larger number of interests thus completely modifying the base structure thus formulated. It is also possible to develop a mathematical estimation for this protocol.

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