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A Review on Geographical Location Based Energy Efficient Direction Restricted Routing In DTN

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Abstract—*Delay Tolerant Network (DTNs) is a wireless network that experiences frequent connectivity and due to mobility of nodes long duration partitions occurred during transmission of data. DTN has the main feature that there is not full path present from source to destination. In Delay Tolerant Network (DTN), traditional routing protocol for mobile Ad-hoc protocol to be ineffective to extend of message transmission between different nodes. Delay tolerant networks (DTNs) are used in many applications like in deep space communications, under water Acoustic Network, Sparsely Populated Areas Networks Etc. In such network a routing with minimum energy congumption is major issue. In this paper, we try to explore a routing issue in DTN. First energy requirement and routing with their corresponding countermeasures in DTN are explained. Moving nodes in DTN keep the updating of network as well energy at every stage. By using the geographical concept the location of each node is maintained by updating in topology. There are many routing protocols are available for routing purpose in DTN.*

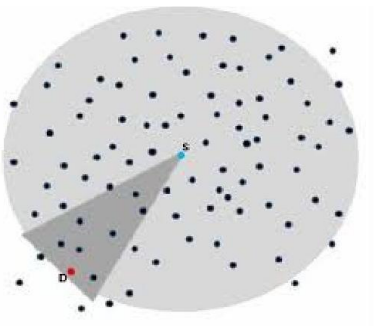
Index Terms- DTN, Geographical Routing, Limited Broadcasting.

I. INTRODUCTION

Delay Tolerant Network (DTNs) is a wireless network that experiences frequent connectivity. Due to mobility of nodes long duration partitions occurred during transmission of data. DTN has the main feature that there is no fixed path available from source to destination. In Delay Tolerant Network majority of traditional routing protocols are less effective in messages transmission.

Delay Tolerant Networks (DTN) have the special feature of intermittent connectivity, which provides opportunistic communication[1] and makes routing in delay tolerant network different from other wireless networks. For successful transmission of packets in network require end-to-end connectivity between nodes. In DTN, connectivity is not constantly maintained still it is desirables to allow communication between nodes. Traditional routing protocols [2] require end-to-end connectivity between nodes. They unable to deliver packets between the hosts. If mobility pattern is unknown, it introduces the problem of lack of knowledge about current position of nodes. In deep space communication or situations like crisis environments the delay tolerant network are applicable. There are some key properties of DTN which makes a great deal of divergence from conventional wireless networks like contemporaneous connectivity, opportunistic communication, large delay and low data rate.

Geographic location based routing (also known as georouting) relies on geographic position information appears as a promising approach for enhancing the routing efficiency in DTNs. Based on geographic location of destination source sends message instead of using the network address like in traditional network. In Geographic routing [3], each node determines its own location as well as it aware the location of the other node. With this information, a message can be routed to the destination without knowledge of the network topology or a prior route discovery. By using geographical location information of destination,



source find the optimal route and limit the transmission area. Restricted message transmission in Delay Tolerant

Network improves the energy efficiency. Energy required for broadcasting message in whole transmission area of source node is large. Thus, by providing restriction on transmission range minimize the energy consumption in delay tolerant network.

Our major Contribution should be to provide restrictions on the broadcasting of the message in Delay Tolerant Network by identifying the expected zone of destination location. Due to limited broadcasting, energy consumption is less as well as bandwidth required for message transmission will be minimize.

II. LITERATURE REVIEW ON ROUTING PROTOCOL IN DTN

Routing in partitioned ad-hoc networks is a challenging problem since end-to-end connectivity may not exist. following routing protocols are based on geographic for energy efficient in delay tolerant network.

A)geoDTN: geoDTN[4] based on geographic location information, which improves upon the hop count compared to the current state of the art by up to a factor of three in large scale human networks.This algorithm well perform in the absence of detailed future schedule information and without knowledge of social interaction between nodes. The scheme employs three routing modes. Distance mode routes a packet by minimizing the distance to the destination on the path to the destination nodes neighborhood. In case of failure rescue mode assures that a message bundle makes progress when stuck in a local minimum. Within the destinations neighborhood a probabilistic scoring function determines the similarity of a nodes movement pattern with that of the destinations with respect to probability and confidence in the stored information. evaluation result shows that, In dynamic and less periodic networks, geoDTN significantly outperformed the other algorithms in hop count and delivery time. GeoDTN needs less hops, thus less transmission energy and distributes the load fairer over the different nodes.

B) Delegation Geographic Routing (DGR):

By considering nodal mobility and message lifetime, DGR[5] overcome the limited routing decision by handling the local maximum problem. they explored DF from an-other aspect, by overcoming the limitation of the geometric metric requiring pairwise encountered nodes moving towards destination and handling the local maximum problem. They assume a scenario consisting of mobile relays and a stationary destination. Mobile relays are equipped with the Global Position System (GPS) that enables them to obtain their realtime geographic information. Also, the location of the stationary destination is available for all the mobile relays under a two dimensional scenario. Each message is only relayed via the selected candidate nodes, or delivered when its carrier encounters the stationary destination. evaluation results show the reliability of DGR in terms of delivery ratio and its efficiency in terms of overhead ratio.

C)A Routing Framework based on Encounter Angle:

Taking into account the potential encounter duration based on the consideration of mobility factor is still an open issue even if most of the routing algorithms in DTNs have been proposed in the last few years. this routing framework[6] address the potential encounter duration issue. Two optional routing functions are designed based on the decision made by the encounter angle. The proposed algorithm is designed based on the following assumptions: each node can only obtain its location by the GPS system. When pairwise nodes are in communication, by means of the exchanged signaling information they can calculate the encounter angle between each other. To cope with the limitation mentioned in the related work, this angle is calculated for each message transmission, thus it dynamically adjusts to the current situation. 2: the transmission range is quite small compared with the area of the scenario, therefore it is imprecise to obtain the most recent location for the destination by the broadcast information or a centralized location service system. 3: the mobility pattern is unpredictable and movement never stops even if pairwise nodes are in communication. 4: due to the high mobility, the encounter duration is insufficient for the transmission of all the requested messages. 5: the message deletion due to its expiration time is exclude from this paper since we focus on the message loss due to insufficient encounter duration. Therefore the message lifetime is set to be large enough. The results are evaluated by Opportunistic Network Environment (ONE). they evaluate the performance of Epidemic, Prophet, MaxProp and also implement an algorithm this algorithm not only reduces the number of aborted messages due to mobility factor but also achieves the significant performance compared with other state of the art algorithms.

D) converge-and-diverge (CaD):

Routing in delay/disruption-tolerant networks (DTNs) is without the assumption of contemporaneous end-to-end connectivity to relay messages. Geographic routing is an alternative approach using real- time geographic information instead of network topology information. However, if considering the mobility of destination, its real-time geo- graphic information is often unavailable due to sparse network density in DTNs. Using historical geographic information to overcome this problem, they pro ose the converge-and-diverge

(CaD)[7] by combining two routing phases that depend on the proximity to the movement range estimated for destination. The key insight is to promote message replication converging to the edge of this range and diverging to the entire area of this range to achieve fast delivery, given limited message lifetime. Furthermore, the concept of delegation replication (DR) is explored to overcome the limitation of routing decisions and the local maximum problem. Evaluation results under the Helsinki city scenario show an improvement of CaD in terms of delivery ratio, average delivery latency, and overhead ratio. Since geographic routing in DTNs has not received much attention, apart from the design of CaD, our novelty also focuses on exploring DR to overcome the limitation of routing decision and the local maximum problem, in addition to enhancing efficiency, as DR originally intended

E) Energy efficient Routing and Rate Allocation (ERRA):

(ERRA) [8] scheme based on Q-learning that can optimize the energy efficiency with the constraints of congestion, buffer and delay. ERRA solves the routing and rate allocation together with reinforce leaning, and then make decisions on relay selection and rate schedule. ERRA explores the possible strategies, and then exploits the knowledge obtained to adapt its relay and schedule strategies. ERRA achieves the desired overall objective by considering the stochastic non-cooperative game under on-line multi-commodity routing situations. The simulation results show that ERRA achieves good energy efficiency and delivery ratio within the delay bound.

F) Agent Aided Routing Scheme (AARS):

Authors design a new agent aided routing scheme [9] in Delay Tolerant Networks to avoid large message delivery delay. The main aim of this scheme is to reduce the message delivery delay by spreading the messages faster and efficiently. The source of a message is emitted to create unlimited copies of a message and distribute these copies to agents. Agents acting as the representative of the source receive messages from the source based on their node visited list and delivery predictability. Then, the agents forward the copies to the other intermediate nodes or deliver the message directly to the destination. Thus, the agents help in faster and efficient dissemination of a message in the network which helps in reducing message delivery delay. After they compare newly designed scheme with that of other schemes through simulations. Simulation results show that agent based routing scheme performs better than that of others in different network scenarios.

III. DESIGN FACTORS & CHALLENGES IN DTN

There are some key properties of DTN which makes a great deal of divergence from conventional wireless networks. in this section we briefly examine different challenges of DTN.

I) Routing Strategy:

In DTN routing packets among a network in which a specific hop-by-hop path will most likely not persist must be a major consideration. Hence energy efficient routing protocol should be employed. Mobility and dis-connectivity among nodes will consume more energy than conventional routing technique. The optimal routing strategy is a major challenge in delay tolerant network

II) Energy Consumption:

DTN leads to more utilization of energy resources due to sending, receiving, and storing as well as for computation processes. Contacts available Network nodes send a message when destination come in transmission range of source. Each intermediate node has to store messages of all nodes. This leads to more energy required.

III) Limited longetivity and large Delay

DTN is like sparse mobile network in which nodes can be deployed over hostile environment. fully connected path may not exist between a pair of source-destination. due to the limits of wireless radio range, sparsity of mobile nodes, energy resources, attack and noise, delay may occur in DTN. time needed to travel a bit from source to destination is specifics as delay in any network. in DTN queuing delay large that will take hours or day. delay is partially depends on location of nodes.

IV) Data rate low

Due to dis-connectivity and long latency of data delivery the transmission rate is low. If two nodes never come across the range of each other for long time, then data rate will be considerably reduced.

IV. MOTIVATION

Routing in delay-tolerant networks (DTNs) present new challenges when compared with other kinds of networks. DTN networks can be sparse and partitioned, due to the large distances usually involved

and low node density. This results in a few transmission opportunities and high and unpredictable delays. Taking into account mobility of node in delay tolerant network DTNs register short contact duration and experience rapid changes in topology. Node mobility pattern directly inffuences limited transmission ranges. Physical obstacles and interferences contribute to intermittent connectivity and high error commonly observed in these network.

All these characteristics together with limited message transmission between two nodes with restricted broadcasting. The main objectives of this work are to provide limited broadcasting and minimize the energy consumption in delay tolerant network.

V. PROPOSED WORK AND OBJECTIVE

The main objectives of Proposed Model are:

A) Energy required for transmitting messages in whole area of transmission range of source is large. The propose scheme expected to minimize the energy consumption by limited broadcasting in the network according to destination lactation.

B) Provide Restriction on Message Broadcasting (Limited Broadcasting): Instead of broadcasting messages to all nodes which present in transmission range of source. Provide restriction on broadcasting by considering encounter angle between the source and destination.

C) To Minimizing Bandwidth Consumption and Control Congestion in Delay Tolerant Network: Due to limited broadcasting the bandwidth required for message transmission is less. On using whole transmission area of source for broadcasting, network congestion is high. By providing the restriction on broadcasting, the network congestion will be controlled in Delay Tolerant Network.

In delay tolerant network nodes are moving and position is changing frequently. In such scenario, Source node find the expected zone of destination node by using geographical location base concept. Depends upon location of the destination an angle is form in between the source and destination by using initial and final value of position of destination node. each node maintain a network information table and update that information when network change occurs.

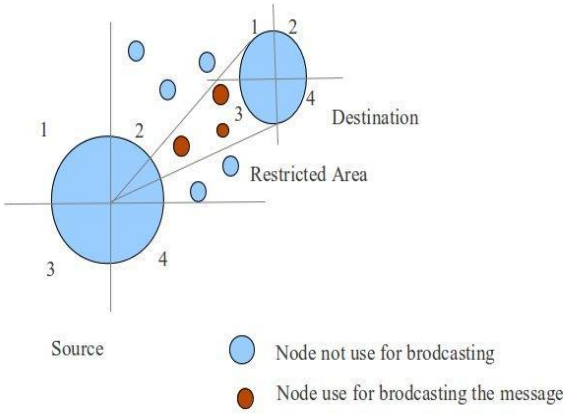


Fig-1: Moving nodes in DTN

The Fig-1 shows the network nodes are moving and each node have partitioning transmission range. Source node first finds the expected zone of destination using geographical scheme and depends on location of the destination the transmission range is restricted and provide limited broadcasting.

In proposed approach source node maintain table with following fields: source id which uniquely identify the source, initial and final position of destination. Unique message id with description of message status such as drop message, message lost or undrop message. Destination id for uniquely identify the destination in network as shown in following table 1.

Table 1: Network Information Table at each node

Source ID	Initial Position of Dest.	Final Position of Dest.	Message-ID	Destination-ID

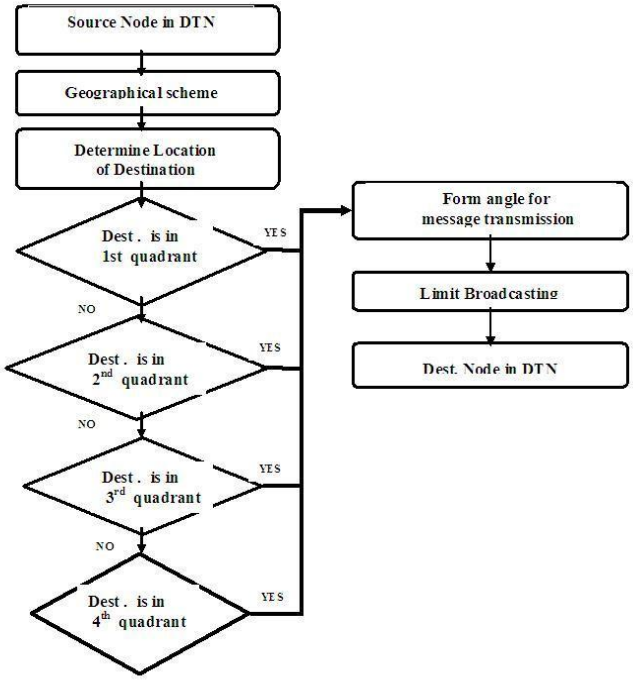


Fig-2 Flow of Propose Model

The Fig-2 shows the flow of design model, the source node will determine the location of destination by using geographical scheme based on initial and final value of destination position. Once the location of destination is fixed, source node will form an angle between source and destination. Angle will form by taking into account speed and radius of node. Propose model limit the broadcasting by restricting the transmission range by forming an angle. Message will transmitted from source to destination within limited transmission range of source and destination.

Instead of using whole area of the available transmission range, proposed model provide restrictions on broadcasting which will minimize energy consumption for mes-sage transmission. Network congestion is controlled by using this routing scheme. The propose work expected to overcome the energy consumption in network for mes-sage transmission by providing restriction on broadcasting in delay tolerant network. In Forthcoming work plan, I will simulate various scenario by using appropriate simulator and compare the results obtained with existing routing protocol.

VI. CONCLUSION

We proposed an energy efficient routing protocol for delay tolerant network and limits the broadcasting in such wireless networks. During literature survey, we found that many of the authors failed to identify the routing issue and also to provide their countermeasure to overcome those issues. Proposed routing protocol tries to reduce the energy consumption. In future work, we will try to compare proposed protocol with other protocols for better performance in energy, bandwidth consumption and data delivery measures.

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