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Effect of Clustering in Map-based Mobility Model on the Performance Issues of Routing Protocols in Delay Tolerant Networks

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Abstract:- In This paper analyze the Effect of Clustering in Map-based Mobility Model on the Performance of Routing Protocols in Delay Tolerant Networks propose a new analysis in mobility models for DTN using Epidemic routing, First Contact Routing, and Direct Delivery Routing. This paper presents two scenarios. ONE Simulator is used to perform these scenarios. Map-based mobility model focus on the movement of node on predefines location on the map. It gives the ability to characterize the behavior and performance of routing schemes, which facilitates one to select appropriate routing protocol for the application or the network in hand. The various DTN routing protocols considered for comparison are Direct Delivery, First Contact, Epidemic routing. Among these protocols: the first three routing protocols do not require any knowledge about the network. The results and analysis show that the proposed Clustered map based mobility model increases throughput, increases delivered packets. Hence the Epidemic routing scheme perform best results different to the first contact routing and direct delivery routing .

Keywords**:** *Delay Tolerance Network, Epidemic routing, First Contact Routing, and Direct Delivery Routing, MBM, Simulation*

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I. INTRODUCTION

Delay Tolerance Network is used in an environment where there is no one point to another point path connectivity. Messages are buffered inside intermediate router and then forwarded to the next intermediate router when contact opportunity arrives. Hardware that can store large amounts of data is required. In a delay-tolerant network traffic classified in three ways these are expedited, normal and bulk. After that Normal traffic is sent at their intended destination. Until all packets of other classes with fast and normal have been successfully transmitted and reassembled Bulk traffic is not in delta . Mobility models represent the movement of user, and how their location and position, change over time. A mobility model that show the behaviour of the nodes in the actual used scenarios is thus needed for a reliable way. Inter-contact times and contact durations are typical parameters. Inter-meeting time is the time interval between two nodes. In which show the time interval a node pair is not interconnected with one node and another node.

II. PREVIOUS WORK RELATED TO NEW WORK

In this Section, define overview of mobility model in DTN namely map based mobility model based on clustering and routing protocol namely Epidemic, First Contact Routing, and Direct Delivery Routing have been described.

Mobility Models A

Node movement capabilities are implemented through mobility models. Evaluations of DTN protocols have used a large variety of synthetic mobility models. These models are based on real life observations. The solutions for Delay Tolerant Networks are sensitive to movement patterns of underlying nodes and rely on how they behave. The mobility models considered in the work for evaluation are:- Random Waypoint model, Map-Based Mobility model and Shortest Path Map-Based Movement model. While nodes move randomly to a random destination in Random Waypoint model whereas Map-Based Mobility model constrains node movement to defined paths and routes are derived from real map. The Shortest Path Map-Based uses the same map based data as in map based but instead of moving randomly. Dijikstra' s algorithm used to calculate the smallest path from source to destination.

Epidemic Routing B.

In Epidemic does not require previous knowledge about the network. Each node retains two buffers. First buffer is used for store the messages. Second buffer is used to receive the message from the another node **.**

Direct Delivery routing C.

In this routing protocol only one copy of each message exist in the network and the message is kept in the source node to send to the destination node. In this method, the message is not forwarded to the near nodes.

First Contact Routing D.

In this protocol the source node send a message to the intermediate nodes and further forward a message randomly from one node to another. If any node come first contact with radio range of the source node will be given the message. It doesn't find the next best hop node moving to the destination.

III. Performance Enhancement in Map Based Mobility Model

In this simulation we created four clusters p, w, j, k each having 10 nodes. Each cluster has cluster center and range in meters. Cluster p is a group of 10 p nodes. Similarly Cluster w, Cluster j and cluster k is a group of 10 w nodes, group of 10 k and 10 j nodes respectively. Nodes do not move randomly on whole area but can only move within their own clusters. Similarly q nodes and r nodes can only move within q and r clusters. These nodes do not transfer data among one to another. Fifth group is tram node group having five nodes. Tram nodes move among clusters and transfer data between generated all clusters. Route followed by tram nodes is specified in a route file.

1) Proposed Algorithm:

Step1. M number of Nodes used to Initialize the area of Simulation.

Step2. The Simulation area divided into four subareas.

Step3. Generate Tram Nodes and for performing routing protocols between these subareas.

Step4. Use a different metrics to check the performance of different routing protocols. These are Epidemic routing, First contact routing, Direct delivery routing.

Step5. Generate a table and graph to find out the better routing protocol in DTN.

Packet Delivery: A.

In this metric show the ratio of the number of messages actually delivered to the destination and the number of messages sent by the sender.

Throughput: B.

In this metric show the Ratio of number of messages actually delivered to destination and number of message send by the sender.

Overhead ratio: C.

The ratio of difference between the total number of relayed messages and the total numbers of delivered messages to the total number of delivered messages.

Average Hop count: E.

It is referred to the number of intermediate device through which data must pass between source and destination.

Varying the number of TRAM nodes: F

The TRAM node are increased as: 7->14->21->28->35->42>49. The time to live field is set to 50 seconds.

Varying the node Time To Live (TTL): G

The TTL Time are increased as: 50->150->200->250->300->350>400. The 5 TRAM node set.

Common Parameters for all scenarios: H.

The simulation parameters are mentioned in the following Table.

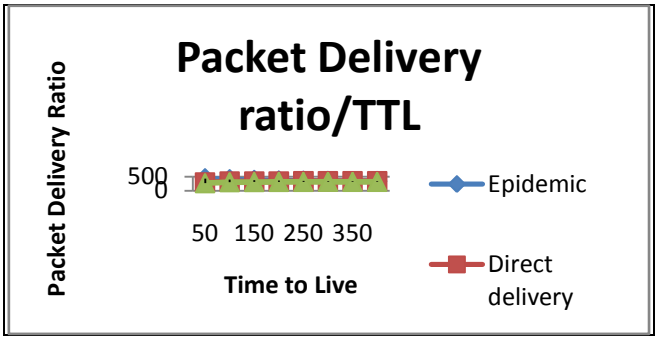
Table - 1
Simulation Parameters

Parameter Description	Value
Simulation Time	30000
Mobility Model	Map based movement
No. of groups	6
Node Speed	1m/s
Warm Up Speed	1000
Time To Live	50 minute
Buffer Size	5M
Routing Scheme	Epidemic, First Contact Routing, and Direct Delivery Routing.

Scenario 1:- According to change of Time To live

Delivered Packets A.

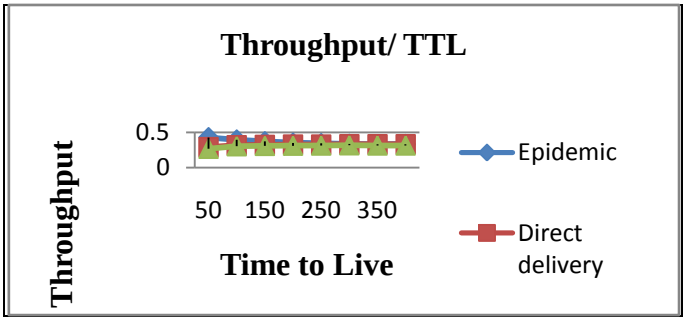
Packets Delivered obtained for proposed clustered map based mobility model based on the various routing schemes are shown in Figure 1. It is clear that the number of packets delivered is different – different in different routing protocols.



Graph 1: TTL v/s Delivered Packets

Throughput B.

Throughputs obtained for based on the various routing schemes proposed clustered map based mobility model are shown in Figure 2. It is clear that the number of throughput is different – different in different routing protocols

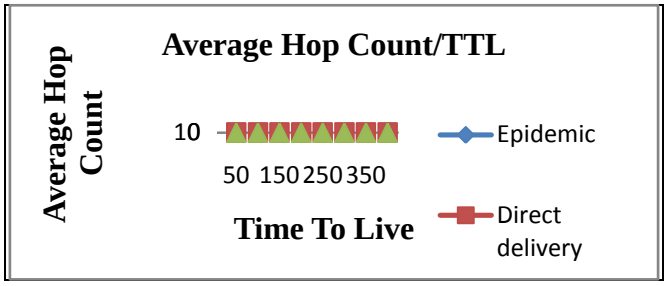


Graph 2: TTL v/s Throughput

C. Average Hop count:-

Average Hop count obtained for proposed clustered map based mobility model based on the various routing schemes are shown in Figure 3. It is clear that the number of Average

Hop count is different – different in different routing protocols.

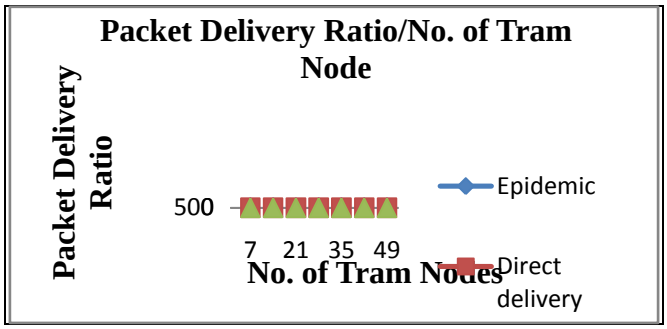


Graph 3 : TTL v/s Average Hop Count

Scenario 2:-

A. Delivered Packets

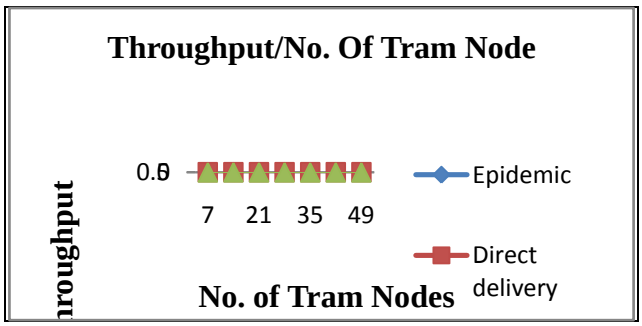
Packets Delivered obtained for proposed clustered map based mobility model based on the various routing schemes are shown in Figure 4. It is clear that the number of packets delivered is different – different in different routing protocols.



Graph 4: Number of Tram Nodes v/s Delivered Packets

B. Throughput

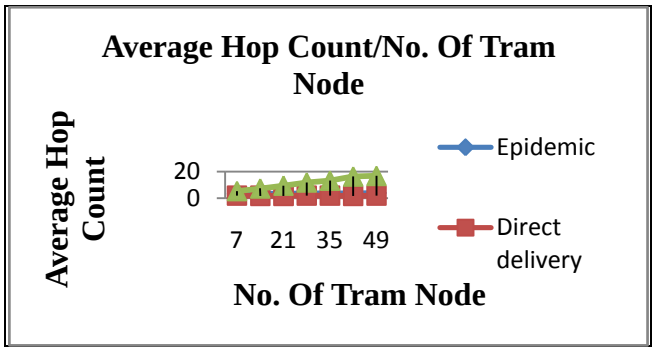
Throughput obtained for based on the various routing schemes proposed clustered map based mobility model are shown in Figure 5. It is clear that the number of throughput is different – different in different routing protocols



Graph 5: Number of Nodes v/s Throughput

C. Average Hop count:-

Average Hop count obtained for proposed clustered map based mobility model based on the various routing schemes are shown in Figure 6. It is clear that the number of Average Hop count is different – different in different routing protocols.



Graph 6: Number of Tram Nodes v/s Average Hop count

VI. CONCLUSION

In this paper map based mobility models in DTN have been studied and use a map based mobility model on the bases of clustering concept .In which check the performance of various routing protocols and mainly use the three routing schemes : Epidemic routing, First contact routing, Direct delivery routing. From the simulation results, epidemic rounting is perform better than the another because it has maximum Packet delivered, maximum Throughput, minimum Overhead Ratio, Minimum Average Latency.

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