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Data Replication To Increase The Reliability And To Control Congestion In Opportunistic Network

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ABSTRACT: Opportunistic networks are a class of mobile ad hoc networks (MANETs) where contacts between mobile nodes occur 0pportunistically and where a complete end-to-end path between Source and destination rarely exists at one time. In Opportunistic network, node can communicate with each other if are they in radio frequency range. But at the same, if nodes are going out of radio frequency range then communication is not takes place properly. So it results into end to end delay, reducing packet delivery ratio, and significantly reducing throughput.

So this paper is concerned with promoting the data replication method to transfer the overall reliability and congestion control in opportunistic network**.**

I. INTRODUCTION

An opportunistic network as a subclass of Delay-Tolerant Network where communication between nodes are intermittent, so an end-to-end path between the source and the destination may never exist. Ex. Human social network where connectivity occurs opportunistically .In this paper, we proposed two important functions, traditionally provided by the transport layer, are ensuring the reliability of data transmission between source and destination, and ensuring that the network does not become congested with traffic. However, modified versions of TCP that have been proposed to support these functions in MANETs are ineffective in opportunistic networks. In addition, opportunistic networks require different approaches to those adopted in the more common intermittently connected networks, e.g. deep space networks. In this article we capture the state of the art of proposals for transfer reliability and storage congestion control strategies in opportunistic networks.

We are discussing potential mechanisms for transfer reliability service, i.e. data replication method, one to one optimization scheme, reliable neighbour scheme, reliable grouping scheme In this, We have discussed all given methods which results to decrease the time (simulation second) to transfer the packet ,to decrease average end to end delay, to increase packet delivery ratio against, to find out shortest path against node density and overall average packet forwarding against node density.

II. RELATED WORK

Contention-based forwarding: The general idea of CBF is to base the forwarding decision on the current neighbourhood as it exists in reality and not as perceived by the forwarding node. This requires that all suitable neighbours of the forwarding node are involved in the selection of the next hop. CBF works in three steps: first, the forwarding node transmits the packet as a single-hop broadcast to all neighbours. Second, the neighbours compete with each other for the ‘‘right’’ to forward the packet. During this contention period, a node determines how well it is suited as a next hop for the packet. Third, the node that wins the contention suppresses the other nodes and thus establishes itself as the next forwarding node. In the following we describe in detail how contention can be realized on the basis of biased timers..

Timer-based contention: The decentralized selection of one node out of a set of nodes is a common problem encountered in many areas of computer networks. It is known as feedback control in group communication or as medium access control in (wireless and wired) local area networks such as IEEE 802.11.

A standard approach for this selection is by means of timers. In its most simple form, timer based contention requires that each node sets a timer with a random value. Once the first timer expires, the corresponding node responds. The timers of all other nodes are cancelled and their responses are suppressed.

It is important to realize that with this contention algorithm more than one node may respond, even if a _good_ suppression mechanism is used. This will happen when the difference between the timeout value of the earliest timer

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and some other timer is smaller than the time required for suppression. Therefore, the interval from which the timeout values are selected should increase with the number of competing nodes. It was shown in that exponentially distributed random timers can further decrease the number of responses compared to uniformly distributed timers.

To use such a simple timer-based mechanism for the forwarding decision, all nodes that receive the packet check if they are closer to the destination than the forwarding node. If this is the case, a random (exponentially distributed) timer is set to start the contention and the node responding first is selected as the next hop.

The problem of the simple timer-based contention is that all nodes which are located closer to the destination than the forwarding node are treated equally. Thus a node providing minimal progress would have the same chance to be selected as next hop as a node providing a large progress. We therefore propose to determine the value for the timers based on how much progress a node provides toward the destination instead of setting them randomly.

To greedily minimize the remaining distance to the destination, the progress P is defined as

$$P(f, z, n) = \max\left\{ 0, \frac{dist(f, z) - dist(n, z)}{R\ radio} ; \right\}$$

given f is the position of the forwarded r, z the position of the destination and n the position of the considered neighbour. dist is defined as the Euclidean distance between two positions and radio is the nominal radio range. Fig. 1 illustrates the suitability of a node as next hop depending on its location. A progress value (P) of 0 indicates that a node is unsuitable while a value of 1 is optimal and is reached if the node is located at the intersection of the circle delineating the transmission range of the forwarding node and the line from the forwarding node to the destination. Thus P increases linearly from 0 to 1 with the progress that a node at this position would provide for the packet. For the contention in CBF we select the timer runtime as:

$$t(P) = T(1-P);$$

where T is the maximum forwarding delay. This makes sure that the node with the largest progress is selected as next hop. Since the runtime of the timer only depends on the remaining distance to the destination it is identical for all nodes that are located on the same circle around the destination. A packet duplication may occur in the following situation: if the best suited node has a progress of P1 and there exists at least one node with a progress of P such that $t(P) - t(P1) < ð$, where ð is the minimum time interval needed for suppression, then at least one packet duplication occurs. All nodes with progress P and

$$P1 >= P >= 1 - \frac{ð + T(1-P1)}{T} = P1 - ð/T$$

are within this so-called duplication area. An interesting property of the duplication area is that it becomes smaller the closer the best suited node is located to the destination. As long as the positions of the nodes are uniformly distributed this reduces the chance of packet duplication in a similar way as exponentially distributed random timers reduce the chance of packet duplication when compared to linearly distributed random timers.

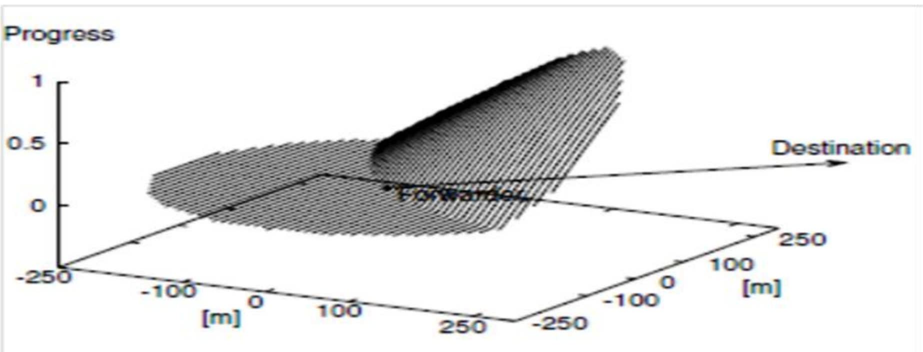

Fig.1: Packet progress (transmission range 250 m)

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III.PROPOSED WORK

In this paper, we are defining the different method of data replication for transfer reliability and storage congestion control strategies in opportunistic networks.

A. Data Replication:

Data replication has been extensively studied in the Web environment and distributed database systems. However, most of them either do not consider the storage constraint or ignore the link failure issue. Before addressing these issues by proposing new data replication schemes, we first introduce our system model. In a MANET, mobile nodes collaboratively share data. Multiple nodes exist in the network and they send query requests to other nodes for some specified data items. Each node creates replicas of the data items and maintains the replicas in its memory (or disk) space. During data replication, there is no central server that determines the allocation of replicas, and mobile nodes determine the data allocation in a distributed manner.

B. The One-To-One Optimization (OTOO) Scheme:

1) It considers the access frequency from a neighbouring node to improve data availability.
2) It considers the data size. If other criteria are the same, the data item with smaller size is given higher priority for replicating because this can improve the performance while reducing memory space.
3) It gives high priority to local data access, and hence the interested data should be replicated locally to improve data availability and reduce query delay.
4) It considers the impact of data availability from the neighbouring node and link quality. Thus, if the links between two neighbouring nodes are stable, they can have more cooperation's in data replication.

C. The Reliable Neighbour (RN) Scheme:

OTOO considers neighbouring nodes when making data replication choices. However, it still considers its own access frequency as the most important factor because the access frequency from a neighbouring node is reduced by a factor of the link failure probability. To further increase the degree of cooperation, we propose the Reliable Neighbor (RN) scheme which contributes more memory to replicate data for neighbouring nodes. In this scheme, part of the node's memory is used to hold data for its *Reliable Neighbours*. If links are not stable, data on neighbouring nodes have low availability and may incur high query delay. Thus, cooperation in this case cannot improve data availability and nodes should be more “selfish” in order to achieve better performance.

D. Reliable Grouping (RG) Scheme:

OTOO only considers one neighbouring node when making data replication decisions. RN further considers all one-hop neighbours. However, the cooperation's in both OTOO and RN are not fully exploited. To further increase the degree of cooperation, we propose the reliable grouping (RG) scheme which shares Replicas in large and reliable groups of nodes, whereas OTOO and RN only share replicas among neighbouring nodes. The basic idea of the RG scheme is that it always picks the most suitable data items to replicate on the most suitable nodes in the group to maximize the data availability and minimize the data access delay within the group. The RG scheme can reduce the number of hops that the data need to be transferred to serve the query.

IV.PERFORMANCE ANALYSIS

Simulation is the imitation of the operation of a real- world process or system over time. Computer simulation is the discipline of designing a model of an actual or theoretical physical system, executing the model on a digital computer, and analysing the execution output. Simulation time and actual clock time are not the same. For example, running a simulation for 10 seconds will usually not take 10 seconds. The amount of time it takes to run a simulation depends on many factors, including the model's complexity, the solver's step sizes, and the computer's clock speed. In this registration of each node is takes place .so simulation time to transfer the data from source node to destination after analysing the data is less than before analysing data.

```
[root@localhost root]# cd core
[root@localhost root]#ns main.tcl
```

No. of node is set 150

INITIALIZE THE LIST XlistHead
SORTING LIST …….DONE!

Channel.cc:sendUp- Cala hihestantennaz_distcst
HighestAntennaz_=1.5,Distcst=1765432156987456321546987651236457965486541235647895564123654789123654
789312331233336447895656323345697756922323644789651223354478921233654486624566221235478965411645
327894653127984123794652134562178935464319876231456179846531234567892135446987436235698.0

10 simulation second.
20 simulation second.
30 simulation second.
40 simulation second.
50 simulation second.
60 simulation second.
70 simulation second.
80 simulation second.
90 simulation second.

[root@localhost root]# grep “<f” ns.trc>fresult
[root@localhost root]#. / Shortan.sh
Please stand By. Analyzing File:simple.tr in/root/core

Real 0m1.754s
User 0m1.660s
Sys 0m0.050s

ANALYZING DATA
Illegal division by zero at ./datashort.pl line.328.<>line 52620,

Real 0m1.305s
User 0m1.180s
Sys 0m0.040s

[root@localhostroot]#gnuplotftime.plot //forwarding time

[root@localhost root]#gnuplot pdr.plot
//packet delivery ratio

[root@localhost root]#gnuplot e2e.plot
//end to end delay

[root@localhost root]#gnuplot pfor.plot
//packet forwarding

A.Impact of node density Vs End to end delay: End-to-end delay or One-way delay refers to the time taken for a packet to be transmitted across a network from source to destination. It is a common term in IP network monitoring, and differs from Round-Trip Time(RTT). The node density impacts routing evaluations since it determines, together with the mobility model, how many neighbours a node has.fig 2 shows the performance of end to end delay Vs node density.

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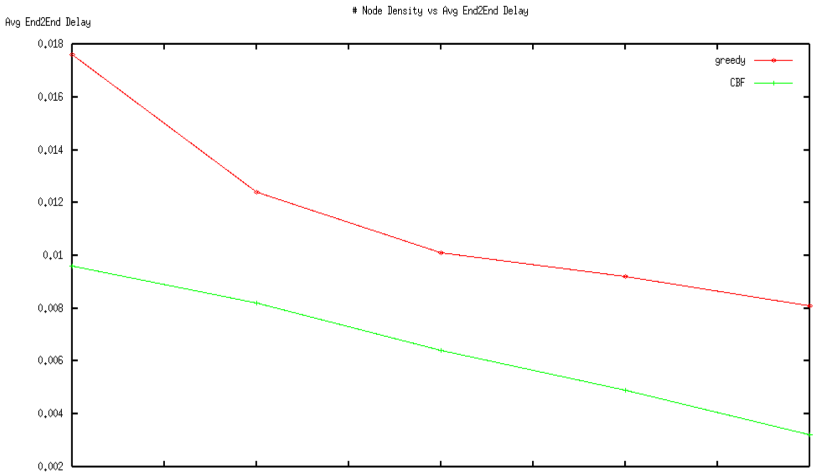

Fig.2 : Node density Vs end to end delay

B. Node density Vs Avg path length

In this ,we are finding shortest path to reduce average path length between the nodes which results into reliability and reducing packet delay. Fig. 3 shows graphical representation of node density Vs Avg path length.

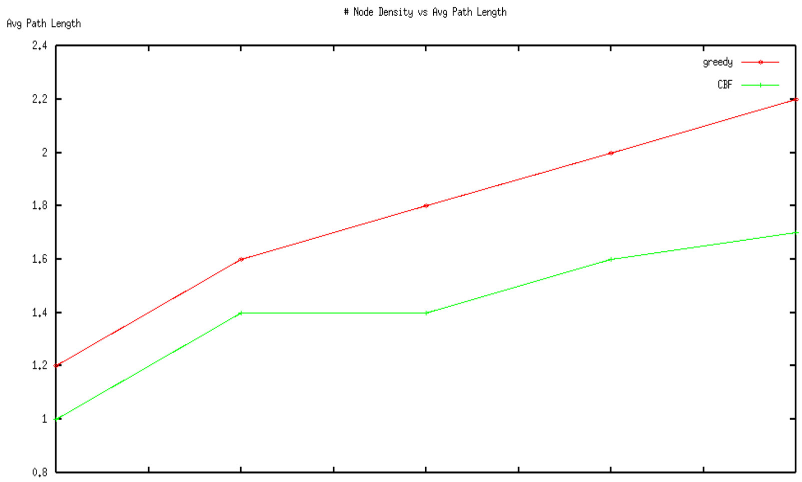

Fig. 3 : Node density Vs Avg path length

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C.Node density Vs Packet delivery ratio

Fig. 4 shows the ratio of packet delivered by selected nodes against total number of nodes present in network.

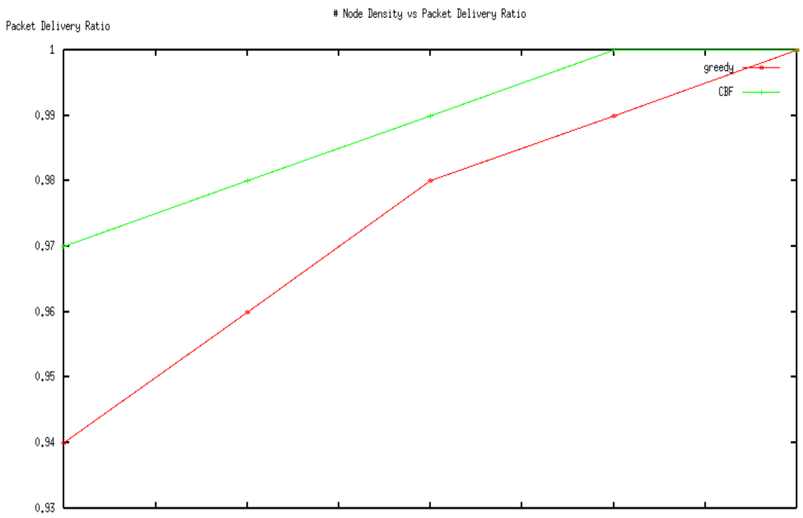

Fig.4 : Node density Vs Packet delivery

4. P Vs forwarding time

Fig. 5 shows P (no. of packet) against time required to deliver these packet to destination.

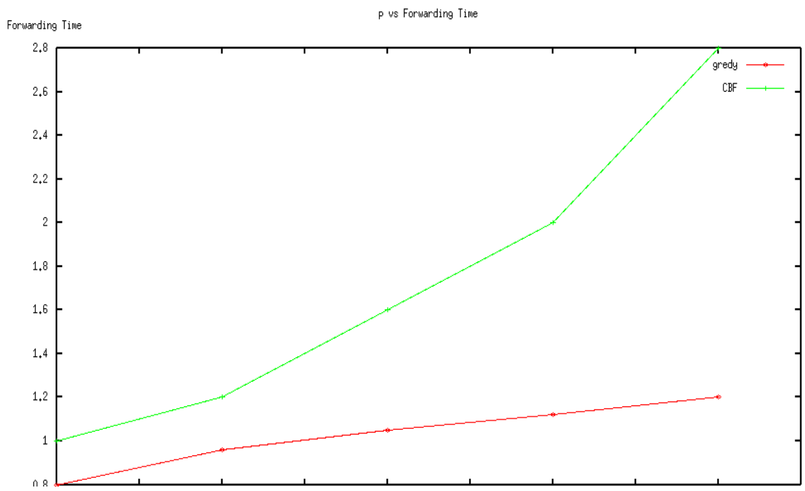

Fig. 5 P Vs Forwarding time

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V. CONCLUSION

Strategies related to congestion and transfer need to be taken care while the messages are being transferred in a hop by hop basis manner and regularly used fixed networks function like packet dropping ,forwarding , congestions control are interrelated with each other. In this paper we have provided method of replicating the data throw moving nodes (manet's)which results into transferring reliability and congestion control in opportunistic network.

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